



# Shenandoah

## *Alternative Transportation Planning Study*



PMIS No. 56093

### **FINAL REPORT**

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John A. Volpe National Transportation Systems Center  
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# Table of Contents

**List of Tables 3**

**List of Figures 4**

**Report Notes 5**

**Acknowledgments 6**

**Executive Summary 9**

**Chapter 1: Introduction 11**

**Chapter 2: Traveler-Information Services 16**

*Existing Traveler-Information Systems 16*

*Traveler-Information Systems Requirements 17*

*Synthesis of Stakeholder Interviews 17*

*Problems to be Addressed 19*

*Requested Traveler-information Services 20*

*Prioritized List 21*

*Analysis of Prioritized Traveler Information Services 22*

*Partnership Plan 26*

**Chapter 3: Vehicle Study for Rapidan Camp Tour Service 28**

*Current Conditions 28*

*Service Alternatives 35*

*Replacement Vehicle Alternatives 37*

**Chapter 4: ATS Improvements for Skyline Drive Scenic Overlooks 46**

*Introduction 46*

*Use of Daytime Running Lights 46*

*Use of High Visibility Pavement Markings 47*

*Use of a Continuous Milled Rumble Strip at Type II Overlooks 48*

*Enhanced Pavement Markings at Type II Overlooks 51*

*Use of a Rumble Area at the Approaches to Type I Overlooks 51*

*Use of a Bus Pad at Type I Overlooks 55*

*Right-Turn Access Only for Large Vehicles at Type I Overlooks 56*

**Chapter 5: Transportation Data for Planning 58**

*Introduction 58*

*An Overview of the Transportation Planning Process 58*

*Roadway and Traffic Data 60*

*Passenger Rail Service (Amtrak) 68*

*Transit Data 70*

*Air Travel Data 72*

*Other Transportation Services 76*

*Other Potential Data Sources 77*

**Chapter 6: Socioeconomic Characteristics and Trends for the Shenandoah Region 78**

*Introduction 78*

*Understanding Park Visitation 79*

*Demographic Trends in the Shenandoah Region 90*

*Economic Trends in the Shenandoah Region 98*

*Predicting Trends for Park Visitation and ATS Usage 107*

*Potential Areas for Future Study 108*

**Appendix A: Stakeholder Interview Summaries 109**

**Appendix B: Additional Collected Data 129**

## List of Tables

- Table 2-1: Prioritized List of Traveler-Information Services
- Table 2-2: Traveler information systemized sharing mechanisms, time and cost ranking
- Table 2-3: Partnership Plan Checklist
- Table 3-1: Specifications of Current Vehicle
- Table 3-2: Alternative Fuel Availability
- Table 3-3: Vehicle Type Data
- Table 4-1: Description of Macadam Types
- Table 6-1: Population Growth
- Table 6-2: Age Distribution
- Table 6-3: Racial Composition
- Table 6-4: Educational Attainment
- Table 6-5: Number of Business Establishments (2002)
- Table 6-6: Distribution of Business Establishments by Industry
- Table 6-7: Change in the Number Business Establishments (1998 to 2002)
- Table 6-8: Income
- Table 6-9: Residential Building Permits

## List of Figures

- Figure 1-1: Shenandoah National Park and Surrounding Areas
- Figure 1-2: Shenandoah National Park Visitation, 1984-2004
- Figure 1-3: Front Royal Visitor Center Visitation, 1998-2002
- Figure 2-1: Total Telephone Calls to Park Headquarters by Weekday in 2003
- Figure 3-1: Map of Historic Rapidan Camp
- Figure 3-2: The Brown House (The President's Cabin)
- Figure 3-3: Model Year 2000 Dodge Ram 3500 Van
- Figure 3-4: Current External Chair Lift
- Figure 3-5: Access to Rapidan Camp from Skyline Drive
- Figure 3-6: Camp Hoover Bridge
- Figure 3-7: Alternative Tour Schedule
- Figure 3-8: Vehicle Type Photos - Vans
- Figure 3-9: Vehicle Type Photos - Cutaways
- Figure 3-10: Vehicle Type Photos – Small Buses
- Figure 4-1: Retroreflectivity of Pavement Markings
- Figure 4-2: Typical Layout of an Existing “Type I” Overlook on Skyline Drive
- Figure 4-3: Typical Layout of an Existing “Type II” Overlook on Skyline Drive
- Figure 4-4: Proposed Enhanced Pavement Markings and Milled Rumble Strip at “Type II” Overlooks
- Figure 4-5: Proposed Macadam Rumble Area and Stone-Inlaid Rumble Strip at “Type I” Overlooks
- Figure 4-6: Schematic Representation of Macadam Types
- Figure 4-7: Bus Pad Cross Section Concept Design
- Figure 4-8: Right-Turn Access Only for Large Vehicles at Type I Overlooks
- Figure 5-1: Major Roadways in the Shenandoah Region
- Figure 5-2: Virginia DOT Districts in the Shenandoah Region
- Figure 5-3: Skyline Drive Traffic Trends
- Figure 5-4: Planning District Commissions (PDCs) in the Shenandoah Region
- Figure 5-5: Amtrak Passenger Rail Service in the Shenandoah Region
- Figure 5-6: Transit Agencies in the Shenandoah Region
- Figure 5-7: Airports in the Shenandoah Region
- Figure 5-8: Change in Passenger Boardings at Dulles International Airport (1995 to 2004)
- Figure 5-9: Change in Passenger Boardings at Charlottesville-Albemarle Airport (1995 to 2004)
- Figure 5-10: Change in Passenger Boardings at Shenandoah Valley Regional Airport (1995 to 2004)
- Figure 5-11: Intercity Bus Routes in Virginia
- Figure 6-1: Educational Attainment Level and Park Visitation
- Figure 6-2: Marital Status and Park Visitation
- Figure 6-3: Internet Access and Park Visitation
- Figure 6-4: Race and Park Visitation
- Figure 6-5: Gender and Park Visitation
- Figure 6-6: Age and Park Visitation
- Figure 6-7: Income and Park Visitation
- Figure 6-8: Employment Status and Park Visitation
- Figure 6-9: Map of the Shenandoah Region
- Figure 6-10: Historical NPS Visitation by Region
- Figure 6-11: Historical Visitation to Shenandoah National Park
- Figure 6-12: Seasonal Variation in Visitation to Shenandoah National Park
- Figure 6-13: Crime Rates
- Figure 6-14: Airborne Pollutants and Visibility
- Figure 6-15: Unemployment Rates
- Figure 6-16: Income
- Figure 6-17: Retail Gasoline Prices

## Report Notes

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*Front cover photo source:* National Park Service, Digital Image Archives.

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## List of Acronyms

**ADA:** Americans with Disabilities Act  
**ATIS:** Advanced Traveler Information Systems  
**ATP:** Alternative Transportation Program  
**ATS:** Alternative Transportation Systems  
**B2o:** a biodiesel fuel blend consisting of 20% biodiesel and 80% petroleum diesel  
**BEA:** Bureau of Economic Analysis  
**BLS:** Bureau of Labor Statistics  
**C&VB:** Convention & Visitors Bureau  
**CCC:** Civilian Conservation Corps  
**CDL:** Commercial Driver's License  
**CNG:** Compressed Natural Gas  
**DOE:** Department of Energy  
**DRL:** Daytime Running Lights  
**EPA:** Environmental Protection Agency  
**FBI:** Federal Bureau of Investigation  
**FCC:** Federal Communications Commission  
**FHWA:** Federal Highway Administration  
**FLHP:** Federal Lands Highway Program  
**GMP:** General Management Plan  
**GSA:** General Services Administration  
**GVWR:** Gross Vehicle Weight Rating  
**HAR:** Highway Advisory Radio  
**HEV:** Hybrid Electric Vehicle  
**ITS:** Intelligent Transportation Systems  
**MUTCD:** Manual on Uniform Traffic Control Devices  
**NCHRP:** National Cooperative Highway Research Program  
**NPCA:** National Parks Conservation Association  
**NPS:** National Park Service  
**POC:** Point of Contact  
**PMIS:** Project Management Information System  
**RRPM:** Retroreflective Pavement Marker  
**RRRC:** Rappahannock-Rapidan Regional Commission  
**SAE:** Society of Automotive Engineers  
**SHEN:** Shenandoah National Park  
**SHENTEL:** Shenandoah Telephone Company  
**SVTA:** Shenandoah Valley Travel Association  
**TAG:** Transportation Assistance Group  
**TEA-21:** Transportation Equity Act for the 21<sup>st</sup> Century  
**TIC:** Traveler Information Center  
**USDOT:** United States Department of Transportation  
**USGS:** U.S. Geological Survey  
**VDOT:** Virginia Department of Transportation  
**VMS:** Variable Message Sign  
**VNTSC:** Volpe National Transportation Systems Center  
**VTC:** Virginia Tourism Corporation  
**VTI:** Virginia Tech Transportation Institute

## Executive Summary

This project addresses the various transportation issues involving Shenandoah National Park, helps to facilitate the participation of Shenandoah National Park in regional traveler-information systems, addresses various access and safety issues at some of Shenandoah's main attractions, and helps to provide a better understanding of the socioeconomic conditions and trends in the Shenandoah Valley region that may potentially influence current and future visitation. Key findings and future directions are summarized below.

Shenandoah currently has several traveler-information systems in place, including Highway Advisory Radio, the park's web site, a park call-in line, park-produced materials, and road signs. Interviews with park staff, visitors, and other regional stakeholders indicate that the park should be doing more to provide visitors with information they find important, and enhancing visitors' ability to make travel choices most closely matching their interests and needs. Based on analysis of the information collected, including consideration of Shenandoah's environmental context and of the types of information and delivery mechanisms appropriate for the park, a prioritized list of traveler-information services desired by Shenandoah visitors was generated as follows:

1. A systemized means of sharing information with gateway communities
2. Better toll-free number (current park information number is not toll-free)
3. Participation in 511 Virginia, a statewide travelers information system
4. Additional information on the park website

Chapter 2 discusses next steps for addressing these priorities.

One important attraction at Shenandoah is Rapidan Camp, the site of former President Herbert Hoover's summer retreat. Interpretive tours of the site are available, and Chapter 3 of this report focuses on tour scheduling and options for replacement of the tour vehicle. The interpretive tour runs twice per day during the summer months however visitors are frequently turned away due to the limited capacity of the current vehicle and the limited number of tours that are available. However, while a larger vehicle could be procured and tours could be run more frequently, too much visitation could negatively impact the site. An alternative schedule is suggested that would allow four tours daily and would allow the tour vehicle to be driven by an outside contractor, which may have a cost savings to the park. The park is also considering purchasing a new vehicle, and attributes such as type and size of vehicle and fuel source are discussed.

Skyline Drive and its overlooks and viewshed were officially placed on the National Register of Historic Places in April 1997. The overlooks along this scenic drive pose some problems in terms of safety and access. Several designs are presented in Chapter 4 that meet the following two objectives: to functionally accommodate Alternative Transportation System (ATS) vehicles and intercity over-the-road tour bus vehicles at select overlooks, and to improve the level of safety for visitors who use Skyline Drive and access the overlooks. Potential measures that would meet these objectives while being consistent with the historical context and cultural landscape of Skyline Drive and Shenandoah National Park are discussed, including requiring the use of headlights during the day-time, adding rumble strips to signal the proximity of view points, and the creation of bus pads to allow larger vehicles to stop at the overlooks.

Chapter 5 provides an overview of available transportation data that may be of use in support of potential future updates of the General Management Plan (GMP) for Shenandoah National Park. In general, although Shenandoah does not now experience widespread or pervasive transportation-related problems, future trends in visitation growth are likely to be addressed in upcoming GMP updates. The transportation data that is presented comes from a variety of local,

regional, state and federal sources, such as regional airports, metropolitan transportation organizations, Amtrak, 511 Virginia, as well as from the park itself.

An understanding of the determinants of park visitor demand is deemed useful not only for alternative transportation systems planning, but for other purposes as well, such as facilities planning and planning for future staffing requirements. Chapter 6 discusses many factors that are thought to contribute to visitor demand, including demographic and economic characteristics such as age, race, gender, level of education, and income. The analysis presented in this section is meant to serve a useful, if less comprehensive, substitute to a more detailed but resource intensive study. The analysis contained herein is both quantitative and qualitative, and relatively broad in its discussion.

## Chapter 1: Introduction

This project addresses the various transportation issues involving Shenandoah National Park, helps to facilitate the participation of Shenandoah National Park in regional traveler-information systems, and helps to provide a better understanding of the socioeconomic conditions and trends in the Shenandoah Valley region that may potentially influence current and future visitation.

Specific goals of this project include:

- Reviewing existing visitor-survey data and other relevant information, and augmenting such information, as appropriate, to determine what specific traveler-information services are desired by visitors.
- Facilitating partnerships with Travel Shenandoah, the Virginia Department of Transportation, and other interested stakeholders to determine the feasibility of collaborating to provide park visitors with desired area and park traveler-information services.
- Determining what kind of vehicle would be the most appropriate replacement for long-term Rapidan Camp service, and formulating a plan for providing expanded service and operations.
- Assessing Skyline Drive scenic overlooks and recommending ATS-related design, safety, and visitor-information improvements.
- Conducting a socioeconomic study of the Shenandoah visitor region to identify trends that will affect visitation to the park and consequent demand for ATS services.
- Identifying existing Shenandoah transportation-related data, and potential transportation data needs for possible subsequent alternative transportation-planning and park-planning efforts.

The above elements are addressed within this report. The Volpe Center team based its efforts on the findings and final recommendations of the National Park Service Transportation Assistance Group (TAG) which completed a site visit to Shenandoah National Park in March 2002, as well as on the findings of the August 2001 *Federal Lands Alternative Transportation Systems Study*, also known—in reference to the part of TEA-21 that mandated it—as the “Section 3039 study.”

Authorized on May 22, 1926 and fully established on December 26, 1935, Shenandoah National Park encompasses 308 square miles in central Virginia, including 124 square miles of congressionally designated Wilderness. The park has four access points (entrance stations) and three management districts (north, central and south). The park currently receives approximately 1.2 million visitors per year<sup>1</sup>, with most of the visitation occurring along the 105-mile corridor of Skyline Drive, a scenic, historic drive constructed from 1931 to 1942<sup>2</sup> by approximately a dozen different civilian construction contractors.<sup>3</sup> Skyline Drive is open year-round, weather permitting, and includes approximately 70 scenic overlooks and pullouts. Along Skyline Drive, there are two visitor centers, an information center, lodging, camping, and over 500 miles of hiking trails (including 101 miles of the Appalachian National Scenic Trail). The visitor centers, information

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<sup>1</sup> For calendar year 2003, total recreational visitation was 1,163,950 and total non-recreational visitation was 10,962.

<sup>2</sup> McClelland, Linda Flint. *Building the National Parks: Historic Landscape Design and Construction*. The Johns Hopkins University Press, Baltimore. 1998. Page 182.

<sup>3</sup> Construction of related infrastructure such as culverts and overlooks was conducted by the Civilian Conservation Corps (CCC).

center, lodging and campgrounds are open during the peak season (from April through November).

Skyline Drive was developed to provide a scenic driving experience and continues to do so, currently accommodating approximately 500,000 vehicles and 1.2 million visitors annually. In 1997, Skyline Drive and its adjoining overlooks and developed areas were listed in the National Register of Historic Places as an Historic District. Accordingly, special consideration is required in future planning and design efforts in order to recognize and preserve the historical significance of Skyline Drive.

Information from the summer 2001 Shenandoah National Park Visitor Study indicates that 87 percent of visitors come to experience the scenic drive and panoramic views from the overlooks. 75 percent come because the experience is one of solitude and nature. Shenandoah receives its highest visitation in the month of October, when visitors come to view the fall foliage and partake of the breathtaking scenery and wildlife.

During peak season periods, Skyline Drive experiences some crowded conditions at its entrance stations and numerous parking areas, particularly those associated with trailheads and developed areas around campgrounds, stores, food, and lodging in the park. Cars often park informally on lawn areas, along the shoulders of roads, or other areas, resulting in local damage to vegetation. The peak visitation season is when most congestion and transportation-related problems occur, and they tend to be focused in a relatively small number of key areas within the park, such as at entrance stations and visitor centers. Other than these repeated episodic events, no significant congestion issues related to roadways or other visitor areas are reported or experienced.

In August 2001, the *Federal Lands Alternative Transportation Systems Study* (the “Section 3039 study”) highlighted potential ATS needs at Shenandoah, including expansion of Rapidan Camp service, and the use of Intelligent Transportation Systems (ITS) in partnership with Travel Shenandoah and other stakeholders to provide visitor and traveler information services.

A regional traveler information service operated by Travel Shenandoah, a non-governmental organization sponsored by Virginia Tech and the Virginia Department of Transportation (VDOT), has worked with state and regional agencies and businesses to provide a comprehensive traveler information system for visitors to the Shenandoah region. This service provides regional travelers with Internet-based real-time travel and traffic conditions, 511 telephone information service, trip mapping, attraction/event information, and food and lodging information. However, Shenandoah National Park is the only major governmental entity that is not a partner in this service. As reported in the 2001 visitor survey, 48 percent of park visitors rate existing park traveler information as poor or very poor. Only 26 percent consider it good or very good. Nonetheless, 76 percent of visitors indicated that they believe this kind of information is important to them. Only 5 percent felt it was not important. Existing visitor and traveler information services and requirements are reviewed in Chapter 2, and recommendations made for improving these services.

One of the many cultural and historic resource areas in the park is Rapidan Camp, the former summer mountain retreat of President Hoover. Indicative of its historic and cultural significance, Rapidan Camp is designated as a National Historic Landmark on the National Register of Historic Places. The park is in the process of restoring the remaining structures and preserving the cultural landscape in this important area. It currently provides limited interpretive programs and services at the site. Due to the limited carrying capacity of the remaining buildings at the site, and because of the resource sensitivity in the area, the park limits visitation and provides restricted access to the Rapidan Camp area via a leased van operated by park staff on a twice daily basis during the summer and fall peak season. The van has been very successful, conveying

approximately 2,500 visitors to Rapidan Camp in 2001. Chapter 3 presents an analysis of the interpretive tour of Rapidan Camp, focusing on tour scheduling, operational issues and replacement of the existing tour vehicle.

The park also experiences visitation by means of tour buses (with 764 buses in 2001, equating to approximately 18,950 visitors), as well as recreational and other oversized vehicles. Most overlooks are tightly configured, which can lead to conflicts between vehicles and pedestrians. In addition, most overlooks currently provide little or no ATS-related information. In consideration of the possible growth of charter and tour bus service, or the potential development of alternative transportation systems (ATS) and services along Skyline Drive, an assessment of the scenic overlooks along Skyline Drive is presented in Chapter 4, along with recommendations for potential improvements.

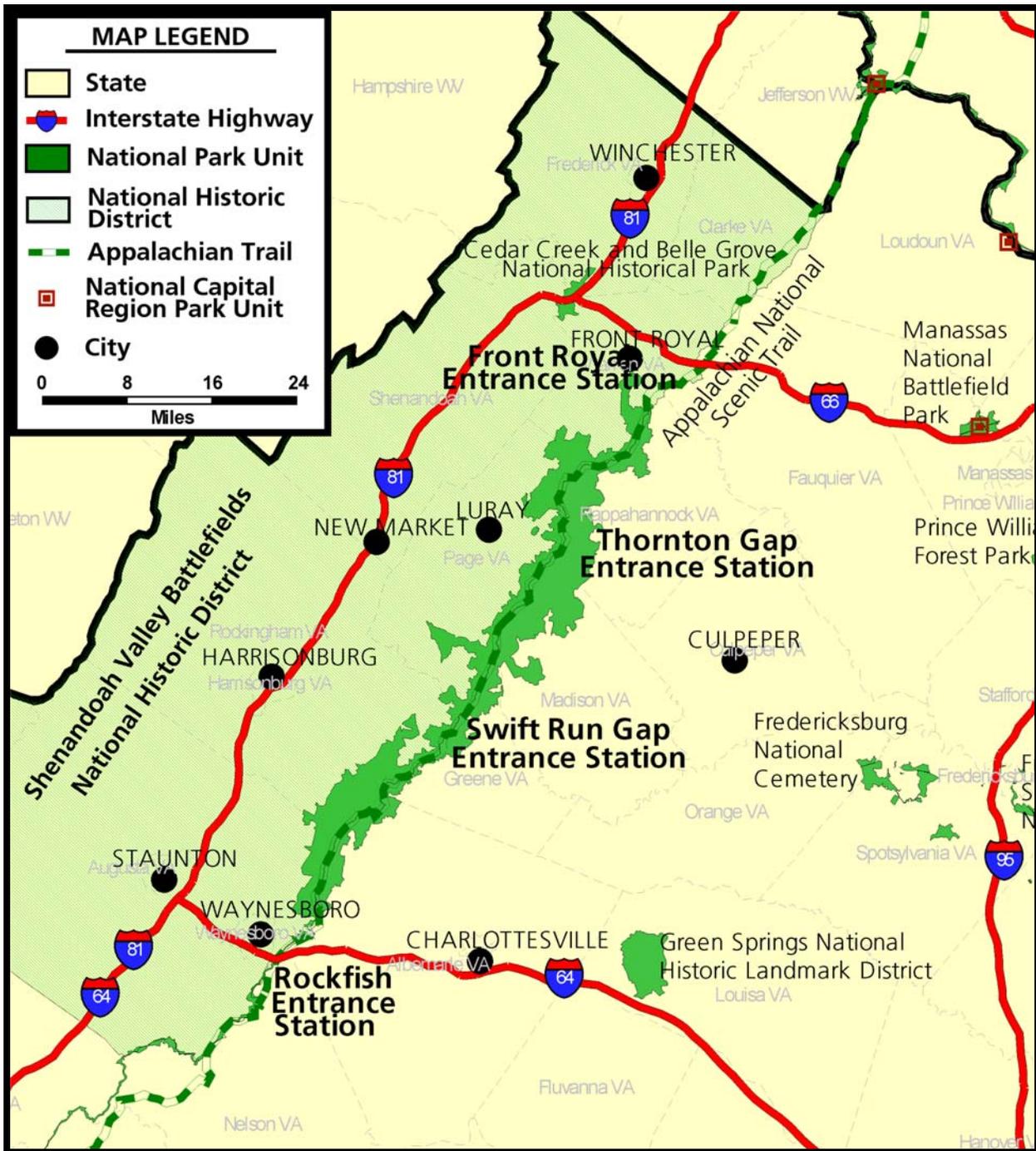
In general, although Shenandoah does not now experience widespread or pervasive transportation-related problems, future trends in visitation growth related to local and national economic factors, growth in surrounding year-round development, technological advancements, and resource conditions must be addressed in upcoming General Management Plan updates. To help support these potential future updates, Chapter 5 identifies existing transportation-related data for Shenandoah National Park, and identifies potential transportation data needs for possible subsequent alternative transportation-planning and park-planning efforts.

Recent years have shown a decrease in overall annual visitation to the park, from approximately 1.9 million visitors annually in the early 1990's, to 1.2 million visitors annually for 2003, the most recent year for which complete data is available. This represents about a 30% decrease in the level of annual visitation over the course of the last ten years. For 2003, Shenandoah National Park ranked 59<sup>th</sup> out of the 355 reporting areas administered by the National Park Service in terms of total annual recreational visitation.<sup>4</sup> Of the 54 reporting areas designated specifically as a National Park, Shenandoah National Park ranked 17<sup>th</sup> in terms of total annual recreational visitation for calendar year 2003. The reasons for the decline in visitation in recent years are not clear. The demographic and economic conditions in the Shenandoah region are reviewed in Chapter 6 in an attempt to identify trends that may affect future visitation to the park and the consequent demand for ATS services.

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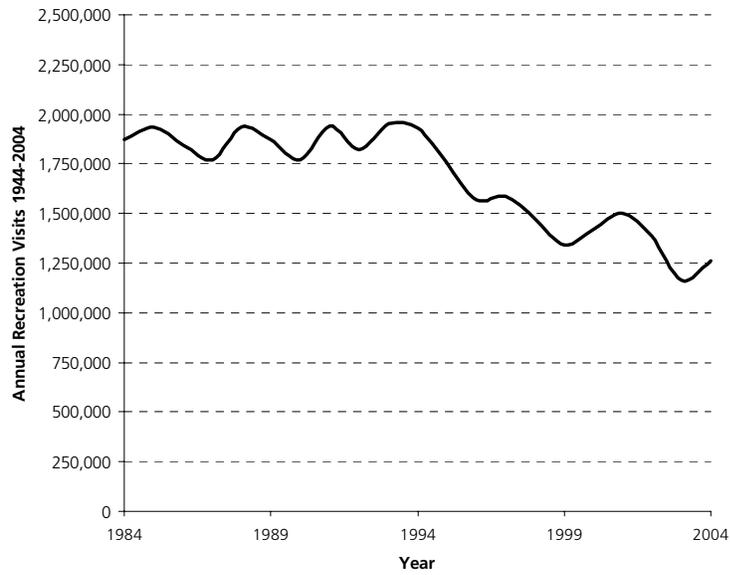
<sup>4</sup> National Park Service. Public Use Statistics Office. URL <<http://www2.nature.nps.gov/mpur/Reports/reportlist.cfm>>

**Figure 1-1**  
**Shenandoah National Park and Surrounding Areas**  
 Source: Volpe Center



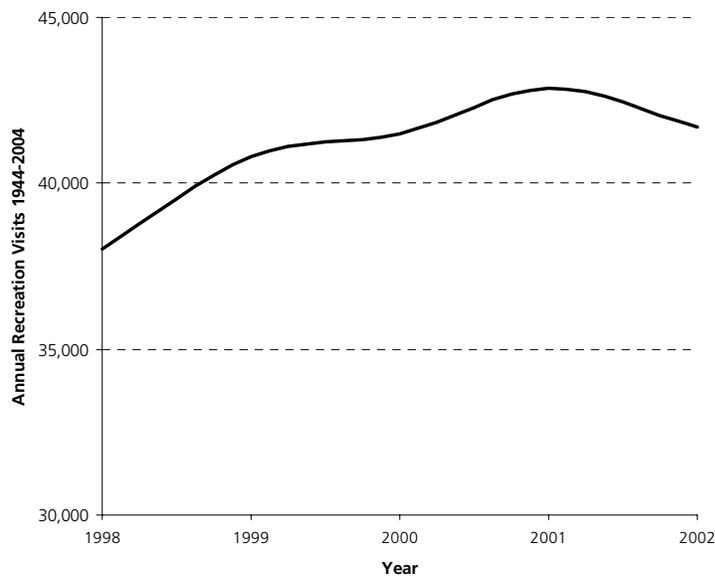
**Figure 1-2**  
**Shenandoah National Park Visitation, 1984-2004**

Source: National Park Service Public Use Statistics Office



**Figure 1-3**  
**Front Royal Visitor Center Visitation, 1998-2002**

Source: Front Royal Visitor Center



(consistent with overall Shenandoah National Park visitation trends)

## Chapter 2: Traveler-Information Services

*Advanced Traveler Information Systems (ATIS) offer users traveler information before and during travel, providing a wide range of choices about how, when, and where to travel based on individual interests and needs. These systems, which are integrated combinations of information sources and delivery mechanisms, are key to improving the preparedness and transportation experience of visitors to Shenandoah National Park. Chapter 2 discusses Shenandoah's existing traveler information services; its traveler information requirements as distilled from interviews with park staff and stakeholders; problems that better information could address; and recommendations for next steps Shenandoah might take in efforts to improve distribution and reception of traveler information.*

### Existing Traveler-Information Systems

According to the 2001 Shenandoah Visitor Study, 76 percent of visitors indicated that they believe traveler information is important to them. In the same study, visitors were asked one additional traveler information question—a question regarding the park's radio service. Forty-eight percent of park visitors rated existing park traveler information from the radio as poor or very poor. Only 26 percent considered it good or very good. With a long-range view to developing existing and new traveler-information services, Shenandoah might 1) better provide to visitors information they find important and 2) enhance its visitors' ability to make travel choices most closely matching their interests and needs.

Shenandoah currently has several traveler-information systems in place. These systems are described below:

1. **Highway Advisory Radio (HAR)**—Three HAR stations exist in the park: one at the Rockfish Gap Entrance Station, one at the Thornton Gap Entrance Station, and one at the Front Royal Entrance Station. At best, each station, broadcasting on 1610 AM, has a service radius between two and three miles.

The broadcast message is a six-minute loop that is updated at varying times throughout the year. Updates are dependent upon long-term facility status, such as 5 pm–8 am winter road closures. The recording is not changed for short-term events, such as snow. At the Rockfish Gap Entrance Station, where the station fees are shared with the Blue Ridge Parkway, each park limits their recording to three minutes.

2. **Park web site**—In addition to a Shenandoah web site maintained by the National Park Service (NPS)<sup>5</sup>, the park maintains its own web site<sup>6</sup>. The park-maintained site offers information on opening and closing dates, available facilities and services and their locations, entrance fees, and activities possible at the park.
3. **Park call-in line**—The phone number (540-999-3500) provided on the park's web site, as well as in its official brochures, is a local phone number that directs callers to a park receptionist at Shenandoah headquarters. The receptionist answers general questions, but refers callers to Shenandoah's web site if they are seeking in-depth information. If no one is in the office to answer a call, callers are connected to a menu on the park's voice-mail system. On the menu, callers can elect to listen to a local weather report, to hear road conditions, or to leave a voice-mail message. Shenandoah's Communications Office/Dispatch Division updates the weather and road conditions information daily.

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<sup>5</sup> National Park Service, Shenandoah National Park web site. URL <[www.nps.gov/shen](http://www.nps.gov/shen)>

<sup>6</sup> Shenandoah National Park web site. URL <[www.nps.gov/shen/home.htm](http://www.nps.gov/shen/home.htm)>

4. ***Park-produced materials***—NPS and Shenandoah create official maps of Shenandoah. The official map, *Exploring Shenandoah*, divides the park into five areas, each with brief descriptions of major points of interest in the area. Official maps are free and available at park facilities as well as at chambers of commerce, convention and visitor’s bureaus, and visitor centers in the region. More detailed guides and maps are available at the Dickey Ridge (north) and Byrd (central) visitor centers and at the Loft Mountain Information Center (south).
5. ***Road signs***—Throughout the region, there are brown National Park signs announcing Shenandoah. These signs provide direction and distance information from various points to Shenandoah and Skyline Drive.
6. ***511 Virginia***—On March 8, 1999, the U.S. Department of Transportation (USDOT) petitioned the Federal Communications Commission (FCC) to designate a nationwide three-digit telephone number for traveler information. Seventeen state DOTs, 32 transit operators, and 23 Metropolitan Planning Organizations formally supported the petition. On July 21, 2000, the Federal Communications Commission designated “511” as the single traffic information telephone number to be made available to states and local jurisdictions across the country. 511 is now the United States’ traveler information telephone number. As of January 23, 2004, 21 states have active 511 systems<sup>7</sup>.

One of these active systems, 511 Virginia, is in western Virginia along the Interstate 81 (I-81) corridor. The system provides information about traffic; road conditions; food, shopping, and lodging services; and things to do and events to attend along the corridor. Accompanying the phone number is a web site<sup>8</sup> that provides similar information while also allowing users to interactively map trips. Currently, 511 Virginia’s telephone system does not provide information about Shenandoah, but the web site does offer a link to Shenandoah’s web site.

7. ***Other materials***—Aramark, the park’s current concessionaire, produces and distributes brochures and rack cards describing activities and facilities in the park. The concessionaire also promotes the park through advertisements and brief columns in local tourism brochures, as well as its own web site<sup>9</sup>.

### **Traveler-Information Systems Requirements**

To identify and assess the kinds of traveler information that Shenandoah visitors have requested, prefer, and otherwise would benefit from, visitor survey data and information-request data collected by park headquarters were gathered and analyzed. Since most of these data do not directly address the types of traveler information demanded by visitors, a series of interviews with park staff and regional stakeholders was also conducted. From these interviews, visitor traveler-information preferences could be distilled.

### **Synthesis of Stakeholder Interviews**

In an effort to develop a clearer understanding of requested traveler-information systems, 22 different stakeholders were contacted, and 22 interviews were held. Stakeholders included: Shenandoah; local chambers of commerce; convention and visitors’ bureaus; state, regional, and local tourism organizations; Virginia DOT; and 511 Virginia. Each stakeholder was located in one of the counties comprising Shenandoah: Warren in the north; Rappahannock, Madison, Green, and Albemarle in the east; Nelson in the south; and Augusta, Rockingham, and Page in the west. A synthesis of the interviews is found below, while a summary of each interview’s notes is found in Appendix A.

<sup>7</sup> Federal Highway Administration, 511 Deployment. URL <<http://www.fhwa.dot.gov/trafficinfo/511.htm>>

<sup>8</sup> 511 Virginia. URL <[www.travelshenandoah.com](http://www.travelshenandoah.com)>

<sup>9</sup> Aramark’s Shenandoah web site. URL <<http://www.visitshenandoah.com/>>

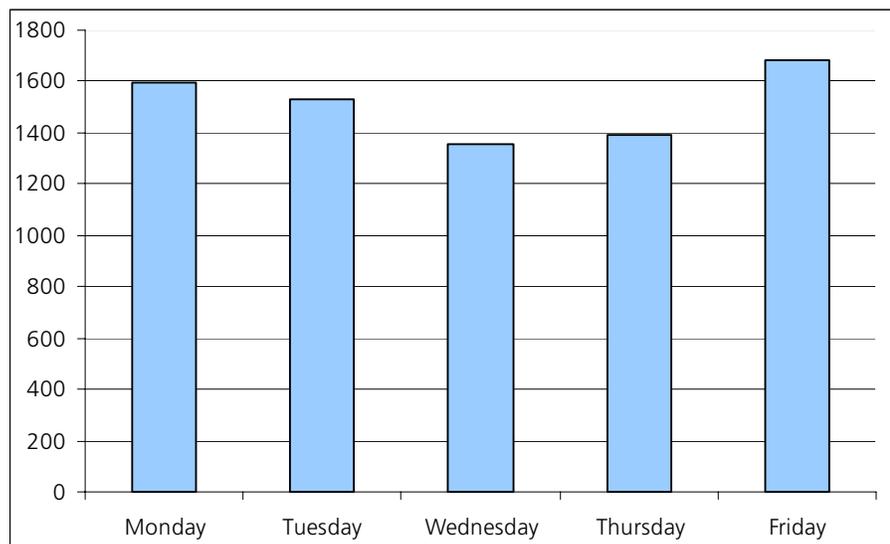
### *Park Staff Interviews*

Eight interviews were held with park staff. This group has the greatest day-to-day contact with park visitors. Interaction typically occurs via the telephone, mail, e-mail, and in-person visits to entrance stations and park headquarters. A majority of the daily requests for information occurs via telephone. For example, during 2003's peak months of July through October (683,119 visitors out of 1,163,950 for the year), staff at park headquarters answered 5,242 phone calls—an average of roughly 15 per working day. Headquarters staff estimates that a majority of these calls are from people asking about topics related to travel information.

Data also indicate that during October, the month with highest visitation, calls to headquarters are likely to peak on Thursdays and Fridays. For the year, park headquarters answers the most calls on Mondays and Fridays. See Figure 2-1 below:

**Figure 2-1**  
**Total Telephone Calls to Park Headquarters by Weekday in 2003\***

Source: Volpe Center, Shenandoah National Park



\*Graph only includes data for weeks for which complete data exists. There is complete data for 32 weeks in 2003. Months without at least one week of complete data include January, February, May, and June.

According to headquarters' staff, most park visitors who visit, call, or email requesting information are characterized as seeming to have done little or no pre-trip planning. Often, the information these people are seeking and the questions they are asking are very basic in nature. Some examples include:

- What is Shenandoah National Park?
- What is there to do at the park?
- Why is there a fee to enter?

These visitors have incomplete knowledge and understanding of the park or activities available to do within it. Headquarters staff noted that the lack of park conception by many of the visitors asking for information is sometimes surprising.

### *Regional Stakeholder Interviews*

According to interviews, many of the information requests that regional stakeholders receive from park visitors are similar to those at Shenandoah. A majority of their interaction with park visitors comes via phone call and in-person visit. A large number of visitors seem to be generally unaware of the park and activities that can be done at the park. Visitors arriving to the region often come with little preparation and are surprised by various aspects of Shenandoah. Stakeholders commented that visitors are most surprised by the following:

1. The \$10/vehicle charge to enter the park;
2. The limited road access nature of Shenandoah and Skyline Drive;
3. The length of and speed limit on the drive;
4. The park being closed at night or due to hazardous driving conditions in winter.

According to the interviews, however, not all visitors are ill informed or unaware and so do not express these misconceptions or experience the related problems. Some visitors are more prepared and tend to ask more specific questions. They are familiar with the park and often have detailed itineraries and activities planned. Generally, these groups consist of local residents, outdoor adventure enthusiasts, or international travelers. The information that they seek tends to be specific in nature. Examples of their questions include:

- What are directions to the park from Washington, D.C.?
- Is there parking at a particular overlook or trailhead?
- Are reservations required at a certain campground?

In the case of both unprepared and prepared visitors, however, stakeholders find themselves fielding questions that might be more appropriate for and better directed towards Shenandoah itself. It is the view of many stakeholders that visitors may be confused as to who they should be contacting to have their Shenandoah-specific questions answered.

### **Problems to be Addressed**

As distilled from park staff and stakeholder interviews, various transportation-related problems exist at Shenandoah that could be addressed with better traveler information services. The kinds of information needed are generally associated with visitors' lack of knowledge and understanding of the park—e.g., its geographic magnitude; what can be done there.

First, there are misconceptions regarding Skyline Drive. Many visitors, including local visitors, believe that Skyline Drive alone comprises Shenandoah National Park, and/or that the drive is an extension of the Blue Ridge Parkway. These visitors often fail to distinguish between the three entities. Visitors are often unaware of Skyline Drive's length, 35 mile-per-hour (mph) speed limit, and winding topography. Some are under the impression that Skyline Drive is a highway for quick travel and can be through-driven in a few hours. Stakeholders in Luray, Va., noted that many travelers, frustrated with the driving pace of Skyline Drive, come through Luray after having left the park at the Thornton Gap Entrance Station en route to Interstate 81 and the faster driving conditions anticipated there. Generally, these same visitors are also unaware that there are limited access points into park, few pull-offs, and a limited number of gas and other service facilities along the drive.

Many visitors, perhaps having gathered information via word-of-mouth, are also under the incorrect impression that the park is open and providing amenities at all times. They are unaware that there is a 10-dollar fee per vehicle to enter the park and that sections of Skyline Drive can be closed due to inclement weather and poor road conditions.

There is also a lack of visitor discernment between park and concessionaire staffs. Visitors sometimes mistake concessionaire staff as interpretive park staff, as concessionaire staff wear uniforms similar to those worn by park staff. To these visitors, questions can go seemingly unanswered since concessionaire staff may lack the training, or job descriptions, appropriate and necessary to provide accurate Shenandoah and NPS information.

### **Requested Traveler-information Services**

There is a lack of expressed visitor demand for specific new traveler-information systems or improvements to existing systems. As seen in the above description of current visitor behavior, many visitors do little or no advance trip planning. Thus, they might not be considering what or how traveler-information services could improve their experience. However, despite the lack of expressed visitor demand, the presence of superior traveler-information services could still be a benefit, both by providing better information to those visitors who already do advance trip planning and by reaching visitors who otherwise—given the traveler-information services currently available—would do little or no planning.

Nevertheless, expenditures on some types of traveler-information services, though capable of providing visitors useful information to better manage their expectations, would not provide feasible or appropriate solutions for Shenandoah. Environmental concerns and high costs associated with some of these systems are considerations paramount to the provision of information services that travelers may or may not use.

A summary of traveler-information systems inappropriate for Shenandoah follows:

- ***Cell-phone towers***—Cell-phone towers might compromise the wilderness character and aesthetic integrity of the park. For a majority of travelers, Shenandoah is a destination they visit to experience the natural beauty and solitude of wilderness. In the 2001 Shenandoah Visitor Study, visitor groups were asked to indicate the importance of various reasons for visiting Shenandoah. As reported in the study, the reasons for visiting with the most “extremely important” and “very important” ratings included viewing the scenic drive and overlooks (87%), enjoying solitude/natural quiet (75%), viewing wildlife and plants (72%), and experiencing wilderness (71%).

Additionally, the construction of cell-phone towers would not be in parallel with NPS and congressional directives. For example, after the Telecommunications Act of 1996 was enacted, Congress instructed federal agencies to devise appropriate policies for preventing the unattractive proliferation of cell-phone towers. A report from the congressional committee stated:

“The Committee recognizes, for example, that use of the Washington Monument, Yellowstone National Park, or a pristine wildlife sanctuary, while perhaps prime sites for an antenna and other facilities, are not appropriate and use of them would be contrary to environmental, conservation, and public safety laws.”<sup>10</sup>

- ***Variable message signs***—Like cell-phone towers, variable message signs would jeopardize the rural character that visitors seek on Skyline Drive. These signs are likely to be viewed by many as undesired eyesores to the landscape along the drive.
- ***Shuttle-bus service***—Despite some gateway communities expressing interest, shuttle bus service appears inappropriate at this time; park management indicated a lack of expressed visitor demand for such service. A shuttle bus service is also inconsistent with what visitor

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<sup>10</sup> House Commerce Committee Report on H.R. 1555, July 1995.

preferences indicated in the 2001 Shenandoah Visitor Study. There, “over one-half of the visitor groups (54%) said it was unlikely that they would be willing to ride a shuttle bus to park facilities and trailheads on a future visit. Twenty-four percent of the visitors were ‘unsure’ about riding a shuttle on a future visit”(136).

Based on the conversations with park staff and stakeholders, it was determined that not all traveler-information systems would present the environmental, social, and economic concerns associated with the above systems. Some traveler-information systems could address the information gaps that park visitors are experiencing without compromising the expressed desire of both visitors and park management. Types of traveler information to which visitors and park management might be amenable include:

- Better information about Skyline Drive’s inherent characteristics, such as its length, speed of driving, and limited number of service facilities;
- Real-time information about Skyline Drive’s variable characteristics, such as weather, road conditions, closures, and congestion at certain attractions or pull-offs;
- Additional information about seasonal attractions and recreational opportunities, such as fall foliage viewing, camping, and other park events. This might also include information about the region and gateway communities and the attractions that are in these areas;
- Information that helps park visitors to distinguish NPS and concessionaire staff.

These types of information can be circulated to travelers in several ways. Delivery mechanisms that might be agreeable to visitors and park management include:

- Radio: commercial stations or HAR;
- Telephone: live, automated, or recorded message;
- Television;
- Web site;
- Road signs;
- NPS print materials (e.g., travel brochure/tour book) received in advance of travel;
- Partner/stakeholder print and Internet materials

### **Prioritized List**

Based on analysis of the information collected, including consideration of Shenandoah’s environmental context and of the types of information and delivery mechanisms appropriate for the park, a prioritized list of traveler-information services desired by Shenandoah visitors was generated. The prioritized list outlines the four traveler-information services (information plus the delivery mechanism) most likely to improve the range of travel choices available to Shenandoah visitors. The prioritized list follows in Table 2-1:

**Table 2-1**  
**Prioritized List of Traveler-Information Services**

Source: Volpe Center

| Rank | Traveler Information Service                                     |
|------|--|
| (1)  | Systemized means of sharing information with gateway communities |
| (2)  | Better toll-free number  |
| (3)  | 511 Virginia   |
| (4)  | Additional park website information                              |

**Analysis of Prioritized Traveler Information Services**

For each of the prioritized traveler information services identified, there is a discussion below of the strategies the park might adopt in order to provide them. Details outlined include when and with whom information can be shared, as well as hardware and financial requirements to do so.

*(1) Systemized Means of Sharing Information with Regional Communities*

Given the geographic expanse of Shenandoah, it may prove difficult to ensure that all of the surrounding communities are informed about the short- and long-term changes, activities, and policies at the park. Without a systemized means of sharing information with the communities, visitors traveling through some communities may be at a disadvantage as far as having their travel-related questions answered accurately and reliably. As a May 2003 U.S. Department of Transportation Intelligent Transportation Systems Joint Program Report<sup>11</sup> notes, traveler-information systems, in order to be effective, must work with a broad set of source data and information, combine and qualify the information to yield better traveler information, and disseminate the information when needed by travelers. Sharing will improve the overall quality, timeliness, and usefulness of information on topics of interest to travelers.

No systemized way of sharing park information with organizations in the region exists. Currently, information from the park, including press releases, Skyline Drive weather forecasts, and road-closure notices, among other information, is unequally distributed. Some area chambers of commerce, convention and visitors’ bureaus, and other organizations that have interaction with travelers receive park communication via phone calls and faxes. (Organizations receiving information sometimes are personally acquainted with park staff.) Other organizations do not maintain communication and have little relationship with Shenandoah. This second group can be left unprepared to answer travelers’ various inquiries about the park. With a systemized way of sharing information, the park can better enable the organizations answering traveler questions to provide information allowing for more cost-effective travel decisions.

The information to be shared could include weather conditions, road conditions, road closures, roadwork, campsite availability, and trail conditions. Since the status of some of these types of information is fluid, and because the park extends over several counties, it may be difficult to provide real-time information to all partners. To overcome this, the park’s four entrance stations could provide variable, regionally specific information, such as weather forecasts, road conditions, and campsite availability to nearby communities and to park headquarters. For more static information, Shenandoah could outline a predefined schedule for sharing, adding provisions for flexibility when changes in conditions (such as weather) warrant special alerts. For example, on Mondays, park headquarters could provide up-to-date information on topics such as planned events and road conditions. On Fridays, park headquarters might send regional

<sup>11</sup> U.S. Department of Transportation Intelligent Transportation Systems Joint Program Office, May 2003: *Data Fusion for Delivering Advanced Traveler Information Services*. URL <[http://www.itsdocs.fhwa.dot.gov/JPODOCS/REPTS\\_TE/13837.html#\\_Toc42042883](http://www.itsdocs.fhwa.dot.gov/JPODOCS/REPTS_TE/13837.html#_Toc42042883)>

communities and organizations the information potentially impacting the decisions of weekend visitors.

It is unlikely that new hardware is required to accomplish this objective. The delivery mechanisms for systemized information sharing are already in place at the park. E-mail, fax, and voice-message systems currently exist at Shenandoah and in communities with which the park would likely maintain communication. The time and cost likely associated with sharing traveler information via these three mechanisms is ranked in Table 2-2.

**Table 2-2**  
**Traveler information systemized sharing mechanisms, time and cost ranking**

Source: Volpe Center, Shenandoah National Park

|               | Time | Cost |
|---------------|------|------|
| E-mail        |      |      |
| Voice Message |      |      |
| Fax           |      |      |

|          |     |         |
|----------|-----|---------|
| LEAST >> | >>> | >> MOST |
|----------|-----|---------|

E-mail is least time consuming. After a template e-mail has been developed and an address list compiled, fields for variable information can quickly be filled and sent. Costs associated with this mechanism include Internet access fees and any computer maintenance and upgrades that the park decides to make. Conversely, the least expensive mechanism for information sharing would be the voice message, a mechanism already used at the park. Costs include phone line access fees and any phone maintenance required. Park staff would be required to change the message as new and pertinent traveler information is available. Faxes, likely the most costly method of information delivery, are also used for distributing information regionally. Time costs connect to fax use include: preparation of the fax and use of the dial-up machine. Monetary costs include fax machine maintenance, phone line access, and paper.

To more effectively capitalize on these widely available technologies, the list of those organizations currently receiving faxes and e-mails could be extended to include all interested organizations. This list might include regional tourism organizations, chambers of commerce, convention and visitors’ bureaus, visitor centers, local radio stations, and hotels—organizations that can reach a wide audience at a low cost.

**(2) Better Toll-Free Telephone Number**

Currently, Shenandoah does not have a toll-free number that visitors can call. The phone number for park headquarters also serves as the visitor-information phone number. Long distance charges might be deterring visitors living or staying outside of northern Virginia—area code 540—from calling the park to obtain vital traveler information. A toll-free number with pre-recorded traveler-information messages would help reduce a barrier to pre-trip planning, allowing a larger cohort of Shenandoah visitors inexpensive access to information. For example, in 2001, roughly 75 percent of Shenandoah visitors were from outside Virginia, and it is likely the remaining 25 percent did not all originate their travel in area code 540. Cell-phone users, including those with limited service plans, would also be able, and perhaps more likely, to access a toll-free service en route to the park.

The types of traveler information that could be provided by a toll-free telephone number for park headquarters is similar to that provided by systemized information sharing. However, a toll-free

number may be more flexible than communication with regional organizations at some recurring interval. A toll-free number, complete with user menus, would allow users to choose the information and level of detail pertinent to the activity or activities they may be planning. A key menu choice on a toll-free number at Shenandoah would be an option to narrow the information provided to the region of the park to and/or through which travel is anticipated—the southern, central, or northern region. Once a park region is chosen, users will need to be able to access regularly updated and time-stamped information.

Currently, Shenandoah receives phone service through Verizon. The park may consult with Verizon to determine how adding a toll-free number to the existing service would affect monthly billing. Regional telephone companies, such as the Shenandoah Telephone Company (Shentel), could also offer toll-free service to the park; according to a Shentel representative, if Shenandoah chose to acquire toll-free service from Shentel, the park would not be required to give up its current Verizon service. The new service, which would cost 13 cents per minute, billed monthly, would not require any set-up fees, monthly minimums or additional hardware. Similar service with Verizon, or other service providers, is likely available.

### *(3) Participation in 511 Virginia*

A possible drawback to the park's implementation of a toll-free telephone number is the potential difficulty of initiating an awareness of the service among park visitors. However, the creation of such a service would allow Shenandoah to more easily tie into the increasingly known and used 511 traveler-information system. The system, which is being promoted by USDOT, is being developed nationwide and is intended to give travelers information that can improve their ability to make transportation choices.

In 2002, Virginia received \$100,000 in federal funds to develop an approach to implementing 511 traveler information services. Since then, the Virginia Department of Transportation (VDOT), in partnership with Shentel, Virginia Tech University, and the Virginia Tourism Corporation, has developed a 511 service known as 511 Virginia (formerly known as Travel Shenandoah). Currently, 511 Virginia serves a 325-mile long section of the Interstate 81 corridor, which runs parallel to the national park on the west. The system provides travelers with free and continuous information on traffic incidents, construction, weather forecasts, and tourist information via an automated telephone system, the Internet, and cable television.

VDOT and its partners envision that with the 511 service, traveler information can be delivered to more people than ever before<sup>12</sup>, and recent reports concur. Traveler use of the system has continued to expand, and its utility is being perceived, as indicated in a January 2004 evaluation of 511 Virginia prepared for VDOT<sup>13</sup>. According to the report, 90 percent of survey respondents believed that 511 Virginia was “somewhat useful” or “very useful.” Ninety-nine percent of respondents indicated that they would call 511 Virginia again. Park participation in 511 Virginia would enhance the ability of both new and repeat 511 Virginia users to get to the park and to make more informed travel decisions once there.

As a result of a meeting between Shenandoah National Park staff and 511 Virginia representatives, each agency has added to its web site a link to the other's site. Links to the Shenandoah web site are now found under the “Scenic Drives” and “Please Visit Our Friends” sections of 511 Virginia's site; similarly, Shenandoah has added a 511 Virginia link on its links page, under “State and Local Travel Organizations.” This is a first step to more comprehensive park participation in 511 Virginia. Recommendations for 511 Virginia participation next steps include:

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<sup>12</sup> 511 Case Studies: Shenandoah Valley, Virginia. December 2001. URL <[www.its.dot.gov/511/travshen.htm](http://www.its.dot.gov/511/travshen.htm)>

<sup>13</sup> Swan, Nicole. et al. January 2004. 511 Virginia Evaluation. URL <[http://www.itsdocs.fhwa.dot.gov/JPODOCS/REPTS\\_TE/13987.html](http://www.itsdocs.fhwa.dot.gov/JPODOCS/REPTS_TE/13987.html)>

- *Linking Park Phone Number.* The existing park headquarters phone number and voice message system could be linked to 511 Virginia's phone menu. Travelers needing travel information for the park but not knowing the park's phone number could choose to be linked to the park through the easily memorable "5-1-1" number. Should the park choose to establish a toll-free telephone number, 511 Virginia's phone menu link could easily be updated to link to that number.
- *Sharing Entrance Station Data.* In the operation of the 511 system, the cost of call transfer is assumed by 511 Virginia, not the caller. To cover this and other operational costs, 511 Virginia charges partners to whom calls are transferred \$40 per month to participate. Shenandoah could seek to create a partnership with 511 Virginia in order to have the monthly fees waived.

For instance, since Shenandoah attracts a large number of travelers to the region annually, 511 Virginia and VDOT could benefit from being provided park traffic data. Currently, Shenandoah tracks counts of vehicles entering the park at the four entrance stations. With the technology already in place, it would be feasible for Shenandoah to begin collecting vehicle exit counts as well. In exchange for free 511 Virginia participation, the park could provide these data to 511 Virginia and VDOT on a monthly basis. This information would enhance VDOT's ability to develop a more comprehensive characterization of traffic flows and concentrations in the region.

#### *(4) Additional Park Website Information*

In Shenandoah's 2001 Visitor Study, visitors were asked to identify their preferred way of gathering park information in the future. Of 441 visitor group respondents, 38 percent (the highest percentage reported) indicated that the park's Internet site would be a preferred source of information. Similarly, according to the January 2004 511 Virginia Evaluation, the Internet is the second most used resource for people looking to determine distances and travel times before trips. Comparable anecdotes were reported in the Front Royal Visitor Center Year-end Report for 2002. There, visitor center staff noted:

A slight decline in daily telephone, mail and e-mail requests, as well as in Virginia Travel Guide label production, was perhaps a result of the effectiveness of our web site. Since the web site became fully operational during 2002, we have recorded 13,286 hits. Many of these were undoubtedly the result of the appearance of our web address in all of our print ads<sup>14</sup>.

On the existing Shenandoah National Park web sites maintained by NPS and Shenandoah respectively, information currently provided ranges from general information about the region to in-depth information describing park specifics such as fees, camping and lodging accommodations, facilities' locations and open hours, maps, permits, and regulations. Sweeping changes to the information provided on the web sites are unnecessary. Small additions, however, might offer key information necessary to alleviate visitor misconceptions that became apparent through park and stakeholder interviews. These additions include:

- *Identification of the time needed to through-drive Skyline Drive.* Both the NPS-maintained and Shenandoah-maintained web sites note the 35-mile-per-hour speed limit on Skyline Drive. However, neither site indicates the time required to drive through the park from one end to the other, accounting for the speed limit (as well as for other conditions, such as traffic). The Shenandoah-maintained web site also does not state the mileage of Skyline

<sup>14</sup> LaFever, Donald F. Visitor's Center Report Year-end 2002. January 5, 2003.

Drive. The NPS-maintained site does mention that Skyline Drive is 105 miles in length, but that information is provided in the introductory description of the park and may be overlooked by users who are planning a trip and looking for specific information on travel logistics.

On the NPS-maintained web site, this information could be provided within the “Plan Your Visit” section. For the Shenandoah-maintained site, it is recommended that the “Exploring Shenandoah National Park”—under the “Driving” sub-heading, specifically—is the most appropriate location for this information.

- *Explicitly stated distances between park entrance stations.* Distances between gas, lodging, camping, and other facilities along Skyline Drive are listed on the park-maintained web site. Given that many visitors are surprised by the limited-access nature of Skyline Drive, explicitly stating the distances between park entrance stations might allow more effective travel planning.
- *Addition of a “Bookmark This Page” feature.* Although Internet browsers have built-in bookmark tools, Shenandoah visitors might not know how to use this browser feature, or might not think to use the bookmark tool. An easily visible “Bookmark This Page” feature would allow users a way to quickly save the park web site address to their browser’s favorite links folder. Local and regional visitors—those who are likely to travel to Shenandoah most frequently—would find the most utility in this feature.

The cost of making these web site revisions would be minimal. The web site and technical staff and the information infrastructure needed to update the site are already available. These updates, which will provide static information, could likely be accomplished in a short period of time.

### **Partnership Plan**

To facilitate Shenandoah’s participation in the recommended “priority” regional traveler information systems, several next steps should be considered. The partnership plan checklist presented in Table 2-3 might be used to track momentum towards wider-ranging traveler-information delivery and participation.

**Table 2-3  
Partnership Plan Checklist**

Source: Volpe Center

| Next Step   | Status |
|---|--------|
| Develop preliminary list of regional communities/organizations with which traveler information will be shared   |        |
| Contact those on list to verify desire to be included and to identify additional interested stakeholders.   |        |
| Finalize list.  |        |
| Determine information that will be provided and a schedule for doing so. Information that varies from day-to-day such as weather forecasts might be provided daily during peak visitation months. |        |
| Identify whether regional communities/organizations have information they are willing to share that might benefit Shenandoah's traveler information and general planning efforts.                 |        |
| Consider requiring concessionaire(s) to collect visitor data regarding transportation and traveler information. New questions could be included on existing satisfaction surveys.                 |        |
| Meet with 511/Virginia representatives to discuss involvement.  |        |
| Link with 511/Virginia if desired.  |        |
| Update park-maintained website.   |        |

## Chapter 3: Vehicle Study for Rapidan Camp Tour Service

*Rapidan Camp is the site of former President Herbert Hoover's summer retreat and is now owned and maintained as a part of Shenandoah National Park. Indicative of its historic and cultural significance, Rapidan Camp is designated as a National Historic Landmark on the National Register of Historic Places. This chapter analyzes the interpretive tour of Rapidan Camp, focusing on tour scheduling and replacement of the tour vehicle. The chapter is broken into three sections, the first of which reviews current conditions related to the Rapidan Camp tour (Current Conditions). The second section (Service Alternatives), provides some potential service and operational changes that could provide access to more visitors while considering various constraints. The last section (Replacement Vehicle Alternatives) focuses on the replacement of the tour vehicle based on operational considerations.*

### **Current Conditions**

This section explains various elements of Rapidan Camp and the interpretive tour, including a description of the access road and vehicle used for the tour. The section also provides the background information needed to consider the service and vehicle alternatives discussed in following sections.

#### *Rapidan Camp*

Though approximately a dozen structures existed historically at Rapidan Camp (see Figure 3-1 below), Rapidan Camp currently consists of three remaining buildings: The Brown House, or President's Cabin (see Figure 3-2), where Mr. and Mrs. Hoover stayed; the Prime Minister's Cabin, where the British Prime Minister stayed when visiting; and Creel Cabin, a building that will be used in the future as a caretaker's facility. Each of these buildings is currently undergoing renovation. When renovations are complete (early 2005), the Brown House will be accessible only to those participating in the Park's tour and otherwise will be kept locked. Also, the Prime Minister's Cabin will be open daily with outdoor exhibits explaining the historical and cultural significance of Rapidan Camp.

Currently, Rapidan Camp does not have a caretaker and is unmonitored except by tour leaders and maintenance personnel. A full-time caretaker was stationed at Rapidan Camp until 1997, when the caretaker retired. No one has been hired to this position. Park management is hopeful that volunteers will live at the site on a rotating basis from May through September.

**Figure 3-1**

**Map of Historic Rapidan Camp**

Source: Volpe Center Photo (December 2003)



**Figure 3-2**

**The Brown House (The President's Cabin)**

Source: Volpe Center Photo (December 2003)



### *Interpretive Services*

The park's Chief of Interpretation and Education manages the Rapidan Camp tour vehicle program. The service, which has been running since 2000, consists of two tours daily—a morning and afternoon tour. The morning tour requires reservations while the afternoon tour is left open on a first-come, first-serve basis. In 2003, the tour operated five days per week from Memorial Day through Labor Day and on weekends only during September and October.

Both morning and afternoon tours leave from and return to the Byrd Visitor Center, and each lasts three hours. The drive between the visitor center and Rapidan Camp lasts 30-45 minutes in each direction, providing roughly 1.5 hours of interpretation. A park-employed interpreter both drives the vehicle and leads the Camp tour.

Rapidan Camp serves over 1,000 visitors each year, but people are frequently turned away due to the limited capacity of the current vehicle and the limited number of trips offered. According to the park, vehicle ridership averages 11 passengers per tour on weekdays and 12 passengers per tour on weekends. Sometimes seats are left empty when an entire group cannot be accommodated; for example, when there are two seats available but a group of three is interested in the tour.

### *Current Tour Vehicle*

At present, Shenandoah leases a 2000 model Dodge Ram 3500 from US General Services Administration (GSA) at a cost of \$5,000/year. The vehicle has approximately 13,000 miles and runs on unleaded gasoline. Fuel and maintenance are included in the lease price. Table 3-1 provides the dimensions of the current vehicle.

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**Table 3-1**

**Specifications of Current Vehicle**

Source: Shenandoah National Park based on Volpe Center Questionnaire (November 2003)

| <b>Vehicle Specifications</b> | <b>2000 Dodge Ram 3500</b> |
|-------------------------------|----------------------------|
| Outside Height                | 94 inches                  |
| Outside Width                 | 79.8 inches                |
| Wheelbase                     | 135 inches                 |
| Ground Clearance              | 12 inches                  |
| Gross Weight                  | 9,200 pounds (estimate)    |
| Curb Weight                   | 5,600 pounds (estimate)    |

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The vehicle, which can seat up to 13 passengers (not including the driver), has four rows of seating. The first two rows have low-backed bench seating and fit three persons across. The back two rows, also three seats each, must be removed in order to fit in a wheelchair passenger. These back rows are split with two seats to the left of the aisle and a single seat to the right of the aisle, all of which have high backs. The vehicle capacity is reduced to seven passengers when a wheelchair passenger is aboard. Park staff estimate that approximately three to four wheelchair passengers board the van per season. To allow wheelchair passengers to board, an external wheelchair lift attached to the rear of the van is used. The external design of the chair lift, shown in Figures 3-3 and 3-4 below, allows dirt and other debris to enter and foul its mechanics, causing the lift to be unreliable and increasing maintenance costs.

As a part of the GSA lease, GSA Fleet provides maintenance at a maintenance facility in Stanley, Virginia, fifteen miles from park headquarters. When not in use, the vehicle is stored outside. Currently, Shenandoah does not have a backup to this vehicle.

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**Figure 3-3**  
**Model Year 2000 Dodge Ram 3500 Van**  
Source: Volpe Center Photo (December 2003)



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**Figure 3-4**  
**Current External Chair Lift**  
Source: Volpe Center Photo (December 2003)



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*Rapidan Road*

Figure 3-5 provides a map of access to Rapidan Camp with Rapidan Road highlighted in red and the Mill Prong hiking trail marked in blue. Rapidan Camp is located six miles down Rapidan Road from Skyline Drive. Rapidan road is closed to the public, and consists of road bed of bare rock and course aggregate which is graded annually. In most places, the road is one and a half lanes wide and has limited two-way traffic. The cross sectional width of the roadway is approximately

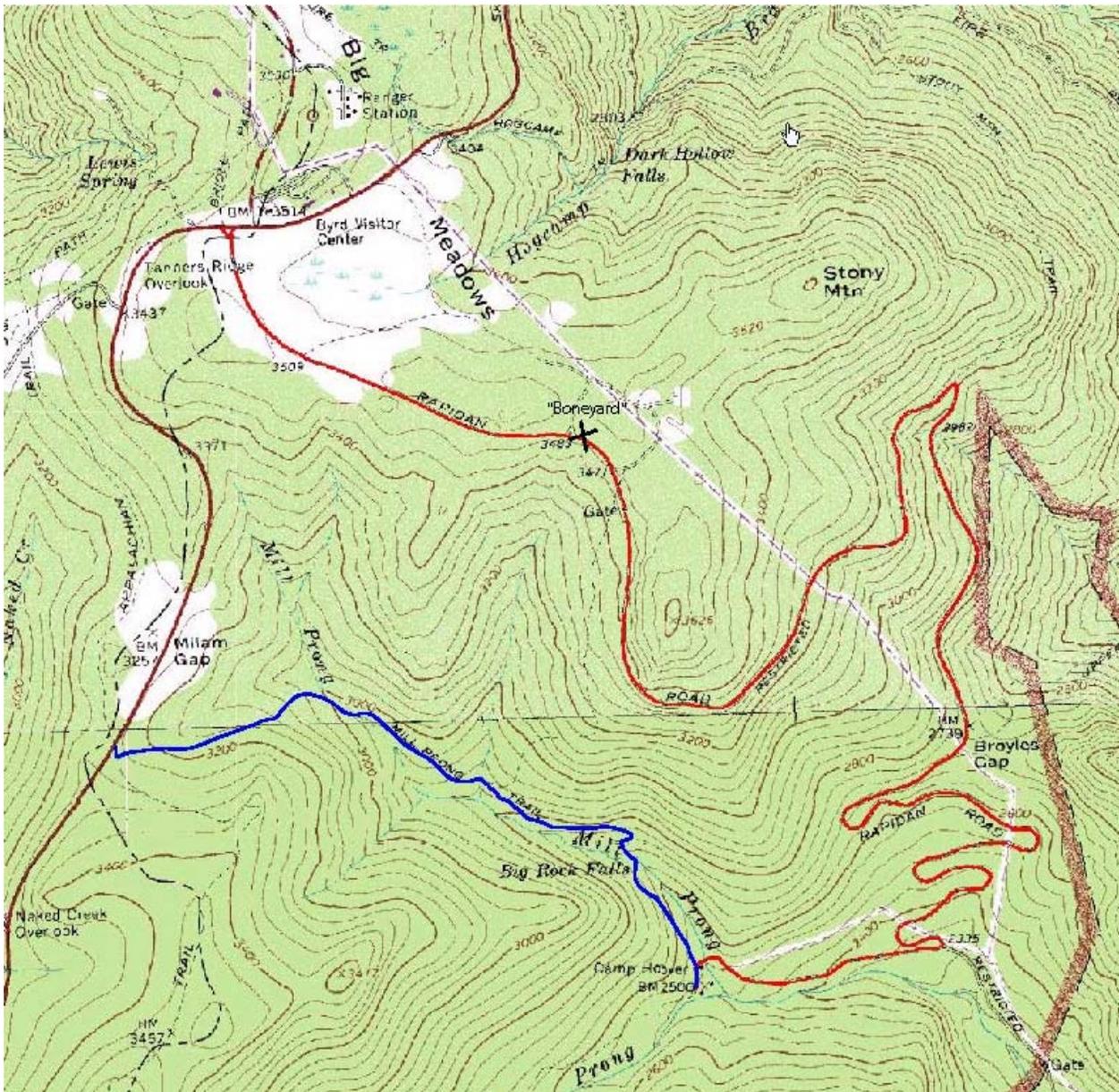
18-20 feet with shoulders along 4.5 miles of the route. There are three tight switchbacks along Rapidan Road, and in some steep areas, the grade exceeds 5%. Although it has some potholes and ruts caused by occasional heavy rains, Rapidan Road is in generally good condition.

Just before Rapidan Camp, Rapidan Road crosses Camp Hoover Bridge, a bridge spanning a small tributary of the Rapidan River (see Figure 3-6). When all passengers are capable of walking to Rapidan Camp, the tour vehicle is parked before the bridge to allow passengers to walk into the camp. With less ambulatory passengers, the vehicle will cross the bridge and drive completely into the camp. Curb to curb, the bridge is 12 feet wide and has a loading capacity exceeding 15 tons<sup>15</sup>.

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<sup>15</sup> Federal Lands Highway, "Bridge Inspection Report: Camp Hoover Bridge." Structure No. 4840-006S, Inspection October 10, 2002.

**Figure 3-5**  
**Access to Rapidan Camp from Skyline Drive**  
 Source: Volpe Center



Legend: ■ Rapidan Road  
■ Mill Prong hiking trail

*Road Use*

Rapidan Road is closed to the public. Ten to fifteen maintenance and tour vehicles drive Rapidan Road daily. Typical weekly traffic includes 10 autos, 28 vans and 20-25 horses. Eight school buses and 50 bicycles per week go as far as the a maintenance lot just beyond the edge of Big Meadow, a few hundred feet off of Skyline Drive. Peak hiking use along Rapidan Road is 200-300 people per day.

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**Figure 3-6**  
**Camp Hoover Bridge**

Source: Volpe Center Photo (December 2003)

**Side View**



**Bridge Deck**



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*Alternative Access*

Additional visitors can tour the camp by hiking 2.5 miles each direction along Mill Prong Trail from Skyline Drive at Milman Gap (mile 52.8). Based on data collected by a volunteer stationed at Rapidan Camp during August 2003, 734 visitors hiked to the site either from Skyline Drive or from Rt. 662—slightly more than were accommodated by the tour vehicle service.

*Service Limitations*

The amount of service is limited by two factors, funding and facility wear. The Rapidan Camp tour program is currently funded to allow a single ranger to run the program for three months, five days per week and two days per week for two months. If additional funding were available, the park has stated that the first priority would be to expand the number of days the tour runs, then use funds to have an additional ranger stationed at Rapidan Camp.

The camp's historic buildings themselves also limit the scope of the tour. Although the buildings are currently being renovated, they are old and too much use may damage the buildings. In addition, the buildings are small and can only fit a maximum of 15 to 20 people at a time. There are concerns that adding additional capacity through a larger vehicle or running too many additional tours may overburden the site. The park has placed a specific emphasis on maintaining a high quality experience for visitors and preserving the structures rather than increasing site accessibility.

### **Service Alternatives**

While the current Rapidan Camp Tour provides a high quality experience, access is limited and does not meet current demand. Some options have been developed that would provide additional interpretation and access to the site, while keeping funding and structural preservation in mind.

#### *Funding*

Currently, funding constrains the number of staff available for interpretation at Rapidan Camp. It is estimated that it would cost \$110 per month to house a volunteer caretaker at Rapidan Camp<sup>16</sup>. It is also believed that an additional paid employee would cost approximately \$19 per hour including benefits. Funds for additional paid staffing might be made available indirectly by ATP funds. At present, Shenandoah spends \$5,000 per year to lease a vehicle from GSA. Instead of leasing a vehicle, ATP funds could be used to purchase a vehicle, reducing vehicle costs. These cost savings would likely result in funds sufficient for one month of additional paid staffing.

Additional funding could also come from charging tour participants. Valley Forge National Historic Park, in Valley Forge, Pennsylvania has been using a questionnaire to assess a one and a half hour guided tour of the park that costs \$15.50. The Park has found that in the view of tour participants, the cost is reasonable. A fee of much less, perhaps \$3 -\$5 per passenger<sup>17</sup>, depending on the number of tours and passengers per tour, would be sufficient to cover the costs of an additional employee.

#### *Operational Alternatives*

With additional funding sources identified, a number of service improvements become feasible, including extending the current visitation schedule, providing for an on-site caretaker/interpreter, and increasing the number of tours.

- **Expand Service/Season**—One use of additional funds would be to expand the season of the current tour service. Service could be expanded from five to seven days a week. The season could also be extended. This would provide additional access without changing the daily number of visitors to Rapidan Camp.
- **Additional Employee Stationed at Rapidan Camp**—Larger funding increases could be used to station a second employee at Rapidan Camp, while keeping the current tour schedule. The person stationed at Rapidan Camp could provide interpretation for hikers and other unscheduled visitors, perform basic site upkeep and provide constant surveillance. Both employees would be at Rapidan Camp during organized tours to provide interpretation and answer questions. Funding a staff member to be stationed at Rapidan Camp would provide an improved experience for those people who choose to hike down on their own, and would also provide better security.

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<sup>16</sup> Cost estimate provided by the Chief of Interpretation and Education: \$50 per month + 4\*(\$10/week for bottled water) + (\$100 for annual supplies)/5 months = \$110 per month.

<sup>17</sup> (\$19/hour \* 8 hours/day) / (13 persons/tour \* 4 tours/day) = \$2.92/person

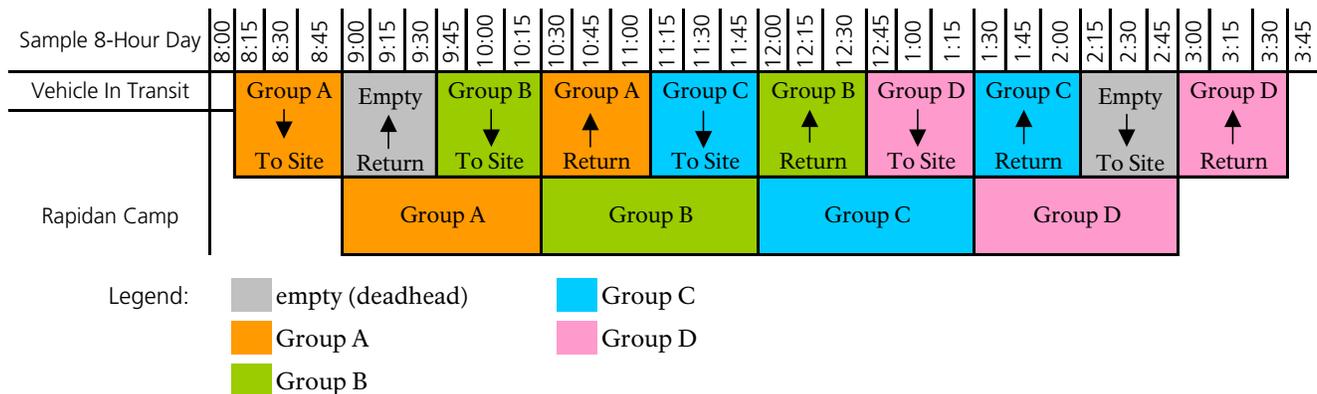
- **Additional Employee with Altered Service**—With two employees, the tour schedule could also be re-planned, allowing twice as many people to visit the site in small groups. Duties could be split so that one individual stationed at Rapidan Camp does all interpretation. The secondary employee would function solely as vehicle driver.

With the current schedule of 1.5 hour tours and 30-45 minute drive times, one person could transport visitors from Byrd Visitor Center to Rapidan Camp and back, while the second employee provides interpretation at the site. This system would allow four tour groups to visit the site in a day, doubling the number of people visiting the site, while keeping each group small.

The proposed schedule is shown in Figure 3-7 with each tour group represented by a color. Travel time and direction are noted as vehicle in-transit, with downward arrows representing travel to Rapidan Camp and upward arrows marking travel time from Rapidan Camp back to the Byrd Visitor Center. Deadheading, or vehicle travel without passengers, is colored gray. The time spent at Rapidan Camp is noted under Rapidan Camp with each group staying at the site for approximately 1.5 hours.

**Figure 3-7**  
**Alternative Tour Schedule**

Source: Volpe Center



Each group would be alone at the site for the 1.5-hour tour but would intersect with the preceding and following groups at Rapidan Camp and the Visitor Center. While the number of people at the site or within the building at a given time would not change, the total number of people using the facility would double. Wear from this additional use would need to be considered<sup>18</sup>.

- **Employment Options**—Whether or not additional tours are added, the employee responsible for driving the bus does not need to be a park ranger since the stationary NPS employee could provide the interpretation. Contracting out the driver position may save the park money, and may make it easier to ensure drivers have commercial drivers’

<sup>18</sup> The schedule described does not consider breaks for either employee nor does it include time for daily fueling and vehicle retrieval/survey. These issues would need to be considered before implementing an increase in service.

licenses. The amount of interpretation currently provided during the drive to and from Rapidan Camp is unknown and may constrain the use of non-park staff although alternate modes of on-vehicle interpretation such as audio or video recordings may be substituted.

### **Replacement Vehicle Alternatives**

While there are no immediate plans to expand service, Shenandoah is interested in purchasing a new vehicle to maintain the service. Currently, Shenandoah leases a 2000 model Dodge Ram 3500 described earlier. Although the vehicle has served the park well, there is no reliable backup vehicle, and the wheelchair lift design has proven unreliable. Ideally, a new vehicle would be purchased in addition to the currently leased vehicle. Shenandoah could also purchase the Dodge Ram as a back-up vehicle, while a new vehicle would be the primary vehicle.

A survey requesting information on route conditions and vehicle features was given to Shenandoah and completed by tour drivers and maintenance personnel. Information gathered from that survey, in addition to discussions and observations from a site visit, were used to help determine vehicles that might be appropriate for the tour. Roadway characteristics that will limit the choice of vehicle are described in the current conditions section above. A summary of desired vehicle characteristics include:

- Class C license (capacity of 15 passengers or less)
- ADA accessible
- Audio system
- Comfortable seats with seatbelts
- Easier access to back of van
- Easy maintenance
- Large side windows
- Heating/Air Conditioning

#### *Commercial Driver's License (CDL)*

As mentioned earlier, capacity of the resources at Rapidan Camp is limited to 15-20 persons at any one time. The ability for the vehicle to be driven by a person without a commercial driver's license (CDL) has been identified as a high priority. In order to ensure that the vehicle can be driven without a CDL, vehicle capacity must be limited to 15 people or fewer and a gross weight rating (GVWR) of 26,000 pounds or less. Any vehicle under the GVWR limit can be driven without a CDL as long as there are 15 or fewer seats. This means that a person without a CDL could drive a larger vehicle simply by removing seats.

While the park would prefer that drivers not need a CDL, it is suggested that the park consider otherwise. Commercial driver's licenses will provide for a higher level of driver training and, thus, limit liability to the park if any incident does occur. The administrative cost of a CDL should only be between \$5 - \$10 per year above that of a standard license<sup>19</sup>.

#### *Alternative Fuels*

The National Park Service generally consider alternative fuel vehicles in their quest to tread lightly on the environment. "Vehicle Technologies"<sup>20</sup>, provides information on vehicle procurements and discusses the various fuel options and should be used as a resource for information on alternative fuel options. Compressed natural gas (CNG) and propane vehicles meeting the requirements of the Rapidan Camp Tour have been commercially produced but may not necessarily be available through GSA, the primary source of vehicles for Federal agencies.

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<sup>19</sup> It is possible that if a contracted driver is used, a CDL would require a higher level of pay.

<sup>20</sup> Chernicoff, William. "Vehicle Technologies." URL <<http://www.nps.gov/transportation/alt/vehicletech.htm>>

Additionally, biodiesel should be considered as a potential fuel. Other alternative fuel technologies were investigated but no commercially available vehicles were found that would be appropriate for the Rapidan Camp Tour conditions, including hybrid-electric vehicles. While these fuels are generically seen as better alternatives to traditional fuels, there may be reasons that they are not preferable for a given park. Local availability of each of the alternative fuels and needed changes to infrastructure are discussed below to provide background into the feasibility of using these fuels. It should be noted that Shenandoah currently has fueling facilities for unleaded gasoline and diesel vehicles only.

### *Biodiesel*

Biodiesel is an alternative fuel produced from domestic renewable resources, most typically soybean oil. It can be used in diesel engines with few if any modifications required. Although 100% biodiesel fuel contains no petroleum, it is typically blended with petroleum diesel. A 20% biodiesel and 80% petroleum diesel blend known as B20 is the most commonly available biodiesel blend.

Used in traditional diesel vehicles, biodiesel is a promising alternative fuel because it requires minimal infrastructure, mechanical or maintenance changes. According to the U.S. Department of Energy, biodiesel fuel is currently available in Luray, VA, at East End Exxon located at 717 Main Street.<sup>21</sup> There are also seven other commercial sources of biodiesel fuel located within 100 miles of Luray, VA (see Table 3-2). The National Biodiesel Board notes that biodiesel production plants are proposed for Delaware City, DE and Autryville and Selma, NC but are not currently active, with the closest manufacturers currently located in Ohio and Kentucky<sup>22</sup>.

A diesel vehicle can be purchased and a relatively easy switch to biodiesel made at a later time when it becomes more feasible. Biodiesel could also ultimately be utilized for all diesel vehicles at Shenandoah.

### *Compressed Natural Gas (CNG)*

A reasonable number of compressed natural gas vehicles could be used for the Rapidan Camp vehicle, as many commercially built vehicles have CNG options. Safety and the cost of infrastructure and training are the most important issues when considering CNG. While CNG vehicles can be used for off-road applications, vehicle clearance and protection for the gas tank is of utmost importance. Although the road to Rapidan Camp is graded annually, rain and use can make the surface rough with potholes and loose rocks. If choosing a CNG option, a thorough vehicle design check should be done to make sure that the gas tank is not jarred by the unevenness of poor road conditions.

Shenandoah does not currently have CNG fueling facilities and would either need to use a commercial source or build their own fueling station. The closest CNG fueling station is located in Winchester, VA, more than 40 miles away from park headquarters, providing limited fueling for buses. Assuming that natural gas was available at Shenandoah, building an on-site facility could range from \$4,000, to serve a single vehicle with a slow-fill technique, to \$300,000 to serve a fleet of fast-fill vehicles. Additional training for employees and additional facilities would also need to be built to accommodate storage and maintenance for the vehicle.

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<sup>21</sup> U.S. Department of Energy, Alternative Fuels Data Center, Alternative Fuel Station Locator.

<sup>22</sup> National Biodiesel Board. "Current and Potential Biodiesel Production" October 2003. URL <<http://www.biodiesel.org/buyingbiodiesel/guide/ProducersMap-existingandpotential.pdf>>

### *Propane*

Propane engines may be available for a few vehicles. Vehicles with these engines require separate refueling facilities. A propane refueling station is available 40 miles from park headquarters in Strasburg, VA.

### *Hybrid-Electric*

Hybrid-electric vehicles (HEV) have become popular for their fuel efficiency. Although a few electric buses are commercially available, they are not designed to withstand off-road conditions such as those of Rapidan Road. Additionally, since HEVs are not classified as alternative fuel vehicles under the Energy Policy Act of 1992, GSA does not offer them.

In summary, while alternative fuel vehicles are an option, additional work will need to be done to determine 1) whether appropriate alternative fuel vehicles are available and 2) whether additional investments in fueling and maintenance infrastructure are feasible and desirable, or if fueling vehicles off-site is reasonable.

### *Vehicle Types*

Since the National Park Service is a Federal agency, Shenandoah is required to use the General Services Administration (GSA) to purchase vehicles. Roadway conditions and tour group size are the two main factors affecting the choice of vehicle. These factors limit vehicle choices to passenger vans, cutaway shuttle vehicles, and 22-foot buses. Of these options, only the 15-passenger van is available in CNG, with the rest fueled by either diesel or gasoline.

All vehicles can be equipped with a wheelchair lift. Availability of an interior vs. exterior lift would have to be discussed with each manufacturer.

### *Passenger Vans*

GSA currently offers vehicles made by GMC and Ford. Ford currently offers passenger vans running on gasoline, diesel and CNG while GMC offers only gasoline-fueled vehicles. The Dodge Ram van that Shenandoah currently leases from GSA is no longer sold by Dodge, and in its place Dodge currently offers a van model called the Sprinter, which is sold with a diesel engine only (no gasoline engine is offered). Passenger vans have the advantage of a compact design. In general, they have a height of less than 80" and are 17' –20' long. They carry up to 15 passengers. Passenger vans are also the least expensive option, with prices starting at approximately \$18,000 and increasing with additional options. However, passenger vans generally have little interior headroom at approximately 38"-42" and can therefore be more difficult to enter and exit than larger vehicles.

While the design and construction of passenger vans is robust enough to withstand the demands of service on Rapidan Road, their safety particularly with regards to rollover accidents has received increasing scrutiny recently. Over the last 5 years, safety concerns have surfaced regarding rollovers of 15-passenger vans due to their high center of gravity<sup>23</sup>. Seatbelts, proper driver training and dual rear wheels are believed to reduce both the risk and severity of rollover accidents.

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<sup>23</sup> Harris, Don. "15-passenger van rollovers still in the spotlight." Bus Ride Magazine. March 2003. URL <[http://www.busride.com/2003/03/15passenger\\_van\\_rollovers\\_still\\_in\\_the\\_spotlight.asp](http://www.busride.com/2003/03/15passenger_van_rollovers_still_in_the_spotlight.asp)>

### *Cutaways*

Another option is a cutaway vehicle. Cutaways are based on a standard light-duty or medium-duty truck chassis, with the body designed separately. Typically associated with airport or hotel shuttle services, cutaways provide additional capacity and space but may not be as rugged as vehicles where the chassis and body are integrated. GSA cutaway options have been changing over time and many more cutaway vehicle options are available outside of GSA. Three vehicles in the 17-21 passenger range are currently available through GSA, two from Thomas Built Buses and one from Colonial Equipment Company.

At approximately 96" wide, cutaway vehicles are wider than passenger vans. It is believed that a vehicle of this width will still allow adequate clearance on Rapidan Road, particularly since it is not expected that two of these vehicles would be traveling along the road in opposite directions at the same time. However, if Shenandoah selects a cutaway vehicle for service to Rapidan Camp, it is recommended that a test drive be performed to ensure that there will be adequate clearance. In addition, with 76" inches of headroom, it is easier to enter and exit the vehicle than a passenger van. Prices for these vehicles start at approximately \$50,000.

### *Buses*

The final category of vehicles is a more traditional bus-like vehicle. These vehicles have similar dimensions to the cutaways but are generally considered to be sturdier. The smallest traditional vehicles available are 17' long and seat up to 20 passengers. They are slightly more expensive than cutaways, starting at just over \$50,000. Thomas Built Buses is currently the primary source of this type of bus through GSA.

Additional detailed information on the above types of vehicles is presented in Table 3-3, and Figure 3-8, Figure 3-9 and Figure 3-10 shows photos of the vehicle types. Prior to leasing or purchasing any new vehicle, it is recommended that Shenandoah test drive their preferred alternatives on Rapidan Road to make sure that the vehicle can withstand the uneven terrain and tight turns and that the ride is comfortable for passengers.

**Table 3-2**

**Alternative Fuel Availability**

Source: U.S. Department of Energy, Alternative Fuels Data Center, Alternative Fuel Station Locator

| Fuel Type          | Miles from Luray, VA                                      | Name of Fuel Supplier/ Vendor                  | Street Address              | City            | State | Zip Code | Type of Access                              |
|--------------------|---|--|-----------------------------|-----------------|-------|----------|---|
| Biodiesel          | 0   | East End Exxon                                 | 717 Main Street             | Luray           | VA    | 22835    | Public access; no restrictions              |
| Biodiesel          | 26  | Spankey's Express                              | 2135 Reliance Road          | Middletown      | VA    | 22645    | Public access; no restrictions              |
| Biodiesel          | 28  | Duke's Liberty                                 | 710 Port Republic Road      | Harrisonburg    | VA    | 22801    | Public access; no restrictions              |
| Biodiesel          | 42  | Express Stop Winchester                        | 1511 Martinsburg Pike       | Winchester      | VA    | 22603    | Public access; no restrictions              |
| Biodiesel          | 58  | Leesburg Liberty                               | 2 Harrison Street           | Leesburg        | VA    | 22075    | Public access; no restrictions              |
| Biodiesel          | 88  | Beltsville Agricultural Research Center        | 10300 Baltimore Avenue      | Beltsville      | MD    | 20705    | Government Personnel only                   |
| Biodiesel          | 93  | Taylorville Shell/Tevis Oil Co.                | 2605 W Liberty Rd           | New Windsor     | MD    | 21776    | Public access; no restrictions              |
| Biodiesel          | 93  | Taylorville Shell                              | 2605 West Liberty Rd        | New Windsor     | MD    | 21776    | Public access; no restrictions              |
| CNG <sup>(1)</sup> | 35  | Kernstown Operations Ctr. - Shenandoah Gas Co. | 350 Hillandale Rd           | Winchester      | VA    | 22602    | Buses, limited times; call ahead            |
| CNG                | 44  | City of Charlottesville - Public Works         | 305 4th St NW               | Charlottesville | VA    | 22903    | Government Personnel only                   |
| CNG                | 60  | Super Shuttle - Dulles Airport                 | 22520 Randolph Drive        | Sterling        | VA    | 20166    | Unknown                                     |
| CNG                | 67  | Town of Vienna                                 | 247 Nutley St N W           | Vienna          | VA    | 22180    | Private Station; limited access             |
| CNG                | 71  | Washington Gas Springfield Operations Center   | 6801 Industrial Rd          | Springfield     | VA    | 22151    | Public with restrictions; card key required |
| CNG                | 78  | Washington Gas - Montgomery County Agencies    | 16640 Crabbs Branch Way     | Gaithersburg    | MD    | 20855    | Public with restrictions; card key required |
| CNG                | 78  | Montgomery County Transit                      | 16630 Crabbs Branch Way     | Gaithersburg    | MD    | 20855    | Private Station; limited access             |
| CNG                | 78  | John J. Kirlyn                                 | 40 Derwood Cir              | Rockville       | MD    | 20850    | Private Station; limited access             |
| CNG                | 78  | Supper Shuttle - Reagan National Airport       | 2605 S Clark St             | Arlington       | VA    | 22202    | Public with restrictions; card key required |
| CNG                | 79  | Washington Gas Rockville Station               | 11801 Nebel St              | Rockville       | MD    | 20852    | Public with restrictions; card key required |
| CNG                | 79  | Frederick Gas                                  | 1800 N Market St            | Frederick       | MD    | 21701    | Public with restrictions; card key required |
| CNG                | 80  | East Station                                   | 1240 12th St SE             | Washington      | DC    | 20003    | Public with restrictions; card key required |
| CNG                | 82  | Washington Navy Yard - Anacostia               | 901 M St SE                 | Washington      | DC    | 20374    | Government Personnel only                   |
| CNG                | 87  | Washington Gas Forestville Station             | 4000 Forestville Rd         | Forestville     | MD    | 20747    | Public with restrictions; card key required |
| CNG                | 88  | Washington Gas - Shell Oil                     | 1021 Baltimore Blvd         | Beltsville      | MD    | 20740    | Public access; no restrictions              |
| CNG                | 89  | Andrews Air Force Base                         | 3260 Pennsylvania Avenue    | Forestville     | MD    | 20762    | Government Personnel only                   |
| CNG                | 89  | United Parcel Service                          | 8440 Ardwick Ardmore Avenue | Landover        | MD    | 20785    | Private Station; limited access             |
| CNG                | 96  | Columbia Gas of Virginia                       | 3320 Naval Reserve St B     | Lynchburg       | VA    | 24501    | Public with restrictions; card key required |
| CNG                | 97  | Crown Petroleum - Columbia                     | 9101 Snowden River Parkway  | Columbia        | MD    | 21046    | Public access; no restrictions              |
| CNG                | 97  | James River Petroleum                          | 2730 W Leigh St             | Richmond        | VA    | 23223    | Public with restrictions; card key required |
| CNG                | 97  | James River Petroleum                          | 2730 W Leigh St             | Richmond        | VA    | 23223    | Public with restrictions; card key required |
| E85 <sup>(2)</sup> | 78  | Dept. of Public Works/Fleet Mgmt. Services     | 16640 Crabbs Branch Way     | Rockville       | MD    | 20855    | Private Station; limited access             |
| E85                | 78  | CITGO Quik Mart                                | 801 S Joyce St              | Arlington       | VA    | 22204    | Public access; no restrictions              |
| E85                | 96  | Chevron  | 3240 Fort Meade Rd          | Laurel          | MD    | 20724    | Public access; no restrictions              |
| Propane            | 25  | Strasburg Interstate Mobile                    | 33982 Old Valley Pike       | Strasburg       | VA    | 22657    | Public access; no restrictions              |
| Propane            | 29  | Amerigas                                       | 470 James Madison Hwy       | Culpeper        | VA    | 22701    | Public access; no restrictions              |
| Propane            | 35  | Owens Chevron                                  | 8437 W Main St              | Marshall        | VA    | 20115    | Public access; no restrictions              |
| Propane            | 39  | Interstate Chevron                             | 133 Berryville Avenue       | Winchester      | VA    | 22601    | Public access; no restrictions              |
| Propane            | 47  | Suburban Propane                               | 14111 John Marshall Hwy     | Gainesville     | VA    | 20155    | Public access; no restrictions              |
| Propane            | 55  | U-Haul   | 8537 Centreville Rd         | Manassas Park   | VA    | 20111    | Public access; no restrictions              |
| Propane            | 65  | Suburban Propane                               | Perry St                    | Ridgeley        | WV    | 26753    | Public access; no restrictions              |
| Propane            | 69  | U-Haul   | 2920 Gallows Rd             | Falls Church    | VA    | 22042    | Public access; no restrictions              |
| Propane            | 71  | Suburban Propane                               | 342 Garrett Hwy             | Oakland         | MD    | 21550    | Public access; no restrictions              |
| Propane            | 71  | U-Haul   | 1107 W Broad St             | Falls Church    | VA    | 22046    | Public access; no restrictions              |
| Propane            | 71  | Thompson Gas                                   | 6708 Old National Pike      | Boonsboro       | MD    | 21713    | Public access; no restrictions              |
| Propane            | 78  | Suburban Propane                               | 31 Derwood Circle           | Rockville       | MD    | 20850    | Public access; no restrictions              |
| Propane            | 79  | U-Haul   | 12025 Parklawn Drive        | Rockville       | MD    | 20852    | Public access; no restrictions              |
| Propane            | 81  | U-Haul   | 1835 Shawley Drive          | Hagerstown      | MD    | 21740    | Public access; no restrictions              |
| Propane            | 83  | U-Haul   | 6889 New Hampshire Avenue   | Takoma Park     | MD    | 20912    | Public access; no restrictions              |
| Propane            | 83  | Blossman Gas Inc.                              | 3849 Old Buchingham Rd      | Powhatan        | VA    | 23139    | Public access; no restrictions              |
| Propane            | 84  | U-Haul   | 2421 Chillum Rd             | Hyattsville     | MD    | 20782    | Public access; no restrictions              |
| Propane            | 85  | Suburban Propane                               | 3230 Old Washington Rd      | Waldorf         | MD    | 20602    | Public access; no restrictions              |
| Propane            | 85  | U-Haul   | 3710 St Barnabas Rd         | Suitland        | MD    | 20746    | Public access; no restrictions              |
| Propane            | 87  | U-Haul   | 4599 Allentown Rd           | Suitland        | MD    | 20746    | Public access; no restrictions              |
| Propane            | 88  | AmeriGas                                       | Route 26                    | Kingwood        | WV    | 26537    | Public access; no restrictions              |
| Propane            | 88  | U-Haul   | 8210 Ardmore / Ardwick Road | Landover        | MD    | 20785    | Public access; no restrictions              |
| Propane            | 89  | U-Haul   | 8671 Central Avenue         | Capitol Heights | MD    | 20743    | Public access; no restrictions              |
| Propane            | 89  | Amerigas                                       | 4575 S Amherst Highway      | Madison Heights | VA    | 24572    | Public access; no restrictions              |
| Propane            | 92  | Suburban Propane                               | US Highway 460 & 15 W       | Farmville       | VA    | 23901    | Public access; no restrictions              |
| Propane            | 92  | U-Haul   | 4511 W Broad Street         | Richmond        | VA    | 23230    | Public access; no restrictions              |
| Propane            | 94  | U-Haul   | 1050 Washington Boulevard N | Laurel          | MD    | 20723    | Public access; no restrictions              |
| Propane            | 94  | U-Haul   | 900 N Lombardy Street       | Richmond        | VA    | 23220    | Public access; no restrictions              |
| Propane            | 95  | Columbia Propane Corp.                         | 1701 Brook Road             | Richmond        | VA    | 23220    | Public access; no restrictions              |
| Propane            | 95  | U-Haul   | 8083 Elm Drive              | Mechanicsville  | VA    | 23111    | Public access; no restrictions              |
| Propane            | 95  | U-Haul   | 1760 Park Avenue            | Lynchburg       | VA    | 24501    | Public access; no restrictions              |
| Propane            | 96  | U-Haul   | 6101 Midlothian Turnpike    | Richmond        | VA    | 23225    | Public access; no restrictions              |
| Propane            | 97  | U-Haul   | 500 E Belt Blvd             | Richmond        | VA    | 23224    | Public access; no restrictions              |
| Propane            | 99  | U-Haul   | 1795 Lincoln Way E          | Chambersburg    | PA    | 17201    | Public access; no restrictions              |
| Propane            | 100   | Suburban Agway                                 | 1017 Philadelphia Avenue    | Chambersburg    | PA    | 17201    | Public access; no restrictions              |
| LNG <sup>(3)</sup> | there are no sources of LNG within 100 miles of Luray, VA |  |                             |                 |       |          |   |
| Hydrogen           | there are no sources of LNG within 100 miles of Luray, VA |  |                             |                 |       |          |   |

Source:

U.S. Department of Energy, Alternative Fuels Data Center, Alternative Fuel Station Locator. URL <http://afdcmap.nrel.gov/locator/LocatePane.asp>

Notes:

- (1) compressed natural gas
- (2) E85 is a blend of ethanol (85%) and gasoline (15%)
- (3) liquefied natural gas

**Table 3-3  
Vehicle Type Data**

Source: Volpe Center; US General Services Administration (GSA)

| Vehicle Type Description | GSA Contract Item Number | GSA Standard Item Number Code <sup>(1)</sup> | Manufacturer       | Approximate Base Price Range | Passenger Seating Capacity (without wheel chair) | Alternative Fuel Models Available | GVWR <sup>(4)</sup> (lbs) | Length (ft) | Width (in) |
|--------------------------|--------------------------|--|--------------------|------------------------------|--|-----------------------------------|---------------------------|-------------|------------|
| Van                      |                          | 24   | Ford               | \$18K+                       | 15   | CNG                               | 9,100                     | 19.3        | 79.3       |
| Van                      |                          | 24   | GM                 | \$18K+                       | 15   | CNG <sub>2</sub> <sup>(2)</sup>   | 9,600                     | 19.25 - 20  | 79.4       |
| Cutaway                  | J12                      | 342  | Supreme            | \$44K+                       | 17   | CNG                               | 12,300                    | 22          | 96         |
| Cutaway                  | J12                      | 342  | Thomas Built Buses | \$50K+                       | 17   | CNG                               | 12,300                    | 22          | 96         |
| Cutaway                  | J13                      | 343  | Thomas Built Buses | \$51K+                       | 21   | CNG                               | 14,000                    | 23          | 96         |
| Small School Bus         | A11                      | 301  | Thomas Built Buses | \$37K+                       | 12   | not available <sup>(3)</sup>      | 9,500                     | 14          | 86         |
| Small School Bus         | A12                      | 302  | Thomas Built Buses | \$42K+                       | 16   | not available                     | 12,500                    | 15          | 96         |
| Small School Bus         | A13                      | 303  | Thomas Built Buses |                              | 20   | not available                     | 14,050                    | 17          | 96         |
| Small School Bus         | B12                      | 312  |                    |                              | 16   | not available                     | 14,450                    | 19          | 96         |
| Small School Bus         | B13                      | 313  |                    |                              | 20   | not available                     | 14,450                    | 21          | 96         |
| Conventional School Bus  | Co8                      | 318  | Thomas Built Buses | \$52K+                       | 20   | not available                     | 18,000                    | 17          | 96         |
| Conventional School Bus  | Co9                      | 319  | Thomas Built Buses | \$53K+                       | 24   | not available                     | 19,000                    | 19          | 96         |

**Notes:**

(1) GSA Standard Item Number Codes:

- 24: Passenger Vans: 4x2 van wagon, full size, 15 passenger
- 301: School Buses: 12 Adult/15 Pass, cutaway school bus
- 302: School Buses: 16 Adult/20Pass, cutaway school bus
- 312: School Buses: 16 Adult/24 Pass, stripped chassis school bus
- 342: Shuttle Buses: Cutaway, 17 pass. 4 yr. / 100K mile Altoona Tested
- 354: Shuttle Buses: Cutaway, 17 Pass. 4 yr. / 100K mile Altoona Tested

(2) Bi-fuel, able to operate on either compressed natural gas or gasoline

(3) However, it is possible that these vehicles may still be compatible with the use of biodiesel fuel

(4) Gross Vehicle Weight Rating (GVWR) refers to the maximum loaded weight of a vehicle, including fuel, all fluids and full payload

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**Figure 3-8**  
**Vehicle Type Photos - Vans**

**Ford**



**GM**



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**Figure 3-9**  
**Vehicle Type Photos - Cutaways**



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**Figure 3-10**  
**Vehicle Type Photos - Small Buses**



## Chapter 4: ATS Improvements for Skyline Drive Scenic Overlooks

*This section sets forth several conceptual ideas and designs for the treatment and management of Skyline Drive and its overlooks at Shenandoah National Park. The objectives for the conceptual designs presented herein are twofold: (1) to functionally accommodate Alternative Transportation System (ATS) vehicles and intercity over-the-road tour bus vehicles at select overlooks, and (2) to improve the level of safety for visitors who use Skyline Drive and access the overlooks. These ideas were developed using information gathered during a site visit and field reconnaissance at Shenandoah National Park, and using information gathered from interviews and discussions with Shenandoah National Park staff. The Federal Lands Highway Engineering Study for Roads and Bridges<sup>24</sup> and the Road Inventory Program summary sheets and schematics<sup>25</sup> were also used in developing these ideas.*

### Introduction

Skyline Drive and its overlooks and viewshed were officially placed on the National Register of Historic Places in April 1997. Discussions with Shenandoah National Park staff confirm the importance of historic preservation and restoration in the management of Skyline Drive and its overlooks. In terms of a set of design principles that would circumscribe any proposed ‘treatment,’ this translates to:

- No roadway alignment changes
- Preservation of existing right-of-way limits
- Minimalist approach to signage and pavement markings
- No technology-oriented systems that would be in conflict with the historic context and cultural landscape (e.g., no ITS systems such as vehicle actuated signals, variable message signs (VMS), emergency call-boxes, traffic or weather sensors, etc.)

A variety of conceptual ideas and designs for operating, maintaining and improving Skyline Drive and its overlooks in a manner consistent with its historical character are proposed below.

### Use of Daytime Running Lights

It is recommended that Shenandoah National Park adopt and enforce a “headlights on at all time” policy. The National Park Service owns and operates Skyline Drive and can take such action irrespective of current Virginia Department of Transportation (VDOT) rules and regulations governing the use of vehicle headlamps. Laws in Canada, Denmark, Finland, Hungary, Iceland, Norway and Sweden require that vehicles operate with lights on during the daytime.<sup>26</sup> No other action is more cost-beneficial in reducing accident risk by increasing detectability and visibility of vehicles in all weather and ambient lighting conditions. The benefits of implementing this policy include a reduction in risk of rear-end collisions, head-on collisions, and side-swipe collisions involving left-turning vehicles crossing the centerline to access the overlooks. Multiple studies have determined that daytime use of headlights, in general, reduces the number of multiparty daytime accidents by about 10-15% for cars and motorcyclists.<sup>27</sup> Daytime use of headlights, or daytime running lights (DRLs) in newer vehicle models, also have been determined to improve driver reaction times and estimation of speed and distance. They make vehicles appear closer, which makes drivers less likely to initiate risky maneuvers. In addition, the positive effects

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<sup>24</sup> Federal Highway Administration, Eastern Federal Lands Highway Division, *Shenandoah National Park: Engineering Study for Roads and Bridges*, January 2001.

<sup>25</sup> EFLHD, *Shenandoah National Park: Road Inventory Program schematics*

<sup>26</sup> See, e.g., “Questions and Answers: Daytime Running Lights,” *Road Management and Engineering Journal*, December 1999. URL <<http://www.usroads.com/journals/rmej/9912/rm991203.htm>>

<sup>27</sup> See, e.g., D. Mohan, “Road Traffic Injuries – a Neglected Pandemic,” *Bulletin of the World Health Organization* 2003 81(9), pp. 684-685.

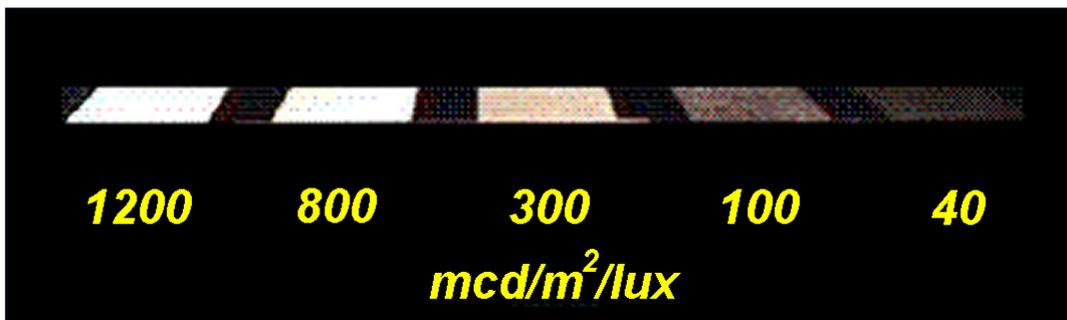
achieved by their use do not dissipate over time.<sup>28</sup> The ability to see other vehicles and be seen by other motorists in their vehicles is enhanced by a policy of “headlights on at all time.” Tests conducted by the Society of Automotive Engineers (SAE) determined that without lights, drivers detect oncoming vehicles when they are 2,074 feet away. With headlights on, the average visibility distance increased to 4,720 feet.<sup>29</sup> With the many horizontal curves on Skyline Drive, the light beam from the headlights of an on-coming vehicle will be seen well before the vehicle comes into the field of view of the opposing vehicle.

### Use of High Visibility Pavement Markings

It is recommended that high luminance, durable pavement marking should be used for the edgelines and centerlines of Skyline Drive. Pavement markings provide important visual cues to drivers with respect to the road alignment, and allow drivers to maintain proper lateral placement within the travel lane and relative to the centerline of the road. Under poor lighting and weather conditions, the retroreflectivity of the pavement marking – the ability of the pavement marking to reflect light back to the driver – is critical. This is of particular importance for Skyline Drive, where there are no other ambient light sources. The use of roadside lighting or retroreflective pavement markers (RRPMs) is also not an option, because their use would impact the integrity of the historic resource and have a negative effect upon the cultural landscape of Skyline Drive.<sup>30</sup>

Retroreflection is accomplished through the embedding of glass beads in the pavement marking binder. A measure of the retroreflectivity of pavement marking material is the coefficient of retroreflected luminance –  $R_L$  – measured using the newer 30-meter geometry which is now the industry standard (in contrast to the older 12-meter specification for retroreflectometers).<sup>31</sup> The 30-meter geometry is also more consistent with safe stopping distances. Figure 4-1 illustrates the coefficient of retroreflected luminance ( $R_L$ ) at distinct threshold values.

**Figure 4-1**  
**Retroreflectivity of Pavement Markings<sup>32</sup>**



As illustrated in Figure 4-1, we recommend a minimum threshold value of 300 mcd/m<sup>2</sup>/lux for Skyline Drive. We make this recommendation although the FHWA-proposed minimum threshold values for non-freeway roadways (<40 mph) without RRPMs or roadside lighting are 85

<sup>28</sup> See *The Open Road* newsletter, July/August 2003.

<sup>29</sup> See URL <[http://www.odot.state.or.us/region3public/archives/safety\\_110102.htm](http://www.odot.state.or.us/region3public/archives/safety_110102.htm)>. See also Horberg, U. and Rumar, K. “The Effect of Running Lights on Vehicle Conspicuity in Daylight and Twilight,” *Ergonomics*. 1979; 22(2):165-173; and Williams, P. R. “Driving at Dusk and the Conspicuity Role of Vehicle Lights: A Review,” *Australian Road Research*. 1984 Dec; 19(4):277-287.

<sup>30</sup> Based on discussions with Shenandoah National Park staff, December 10-11, 2003.

<sup>31</sup> See, for example, NCHRP Synthesis 306, “Long-term Pavement Marking Practices,” 2002.

<sup>32</sup> Source: G. Hawkins, “Pavement Marking Retroreflectivity.” Texas Transportation Institute. PowerPoint presentation at FHWA Southern Resource Center Pavement Marking Conference, 1998.

and 55 for white and yellow marking respectively. Section 406(a) of the 1993 Appropriations Act requires the Secretary of Transportation to revise the *Manual on Uniform Traffic Control Devices (MUTCD)* to include a standard for a minimum level of retroreflectivity that must be maintained for pavement markings and signs. Though the FHWA has developed MUTCD criteria for retroreflectivity of pavement markings, no such criteria have yet been approved and implemented as policy.

The rationale for recommending a higher minimum threshold value is that pavement marking retroreflectivity under wet pavement conditions averages only 46% of the comparable values under dry pavement conditions.<sup>33</sup> Thus, this recommendation guarantees a wet pavement minimum threshold value exceeding 100 mcd/m<sup>2</sup>/lux.

An additional concern and rationale for this recommendation is that older drivers require more threshold contrast value – the minimum difference between luminance of a target and the luminance of the background for detection – and therefore have higher visibility needs. For example, a 65 year old driver requires nearly twice the threshold contrast value that a 23 year old driver needs.<sup>34</sup> Relative to the general population, the demographics of those who visit Shenandoah National Park is skewed towards the older driver.<sup>35</sup>

This recommendation for higher pavement marking retroreflectivity is also complementary to the “headlights on at all time” policy recommended earlier.

#### **Use of a Continuous Milled Rumble Strip at Type II Overlooks**

It is recommended that a continuous milled rumble strip be placed alongside existing pavement marking for Type II overlooks. A review of the Road Inventory Program plan schematics, confirmed by a site visit by Volpe Center and Federal Lands Highway Program (FLHP) staff in December 2004, indicates that there are two fundamental types of overlooks associated with Skyline Drive: Type I overlooks and Type II overlooks.

Type I overlooks (see Figure 4-2) tend to be larger in area, can accommodate more standing vehicles, and are separated from the roadway by a landscaped median. The openings at both ends of the landscaped median serve to delineate the entrance and exit to the overlook, with a dashed white line used to delineate the overlook entrance and exit from the roadway. Traffic flow in Type I overlooks occurs in both directions, and consequently, each median opening serves as both an entrance and exit.

In contrast, Type II overlooks (see Figure 4-3) tend to be smaller in area, accommodate fewer vehicles, and are not physically separated from the roadway by a landscaped median. At Type II overlooks, when there are no sight distance constraints to and from Skyline Drive, the Park Service uses a dashed white line to separate the overlook from the roadway. This pavement marking also indicates that motorists can access the overlook at any point along the line (i.e., turn onto or from Skyline Drive via left or right turning movements depending upon the direction of travel and the location of the overlook).

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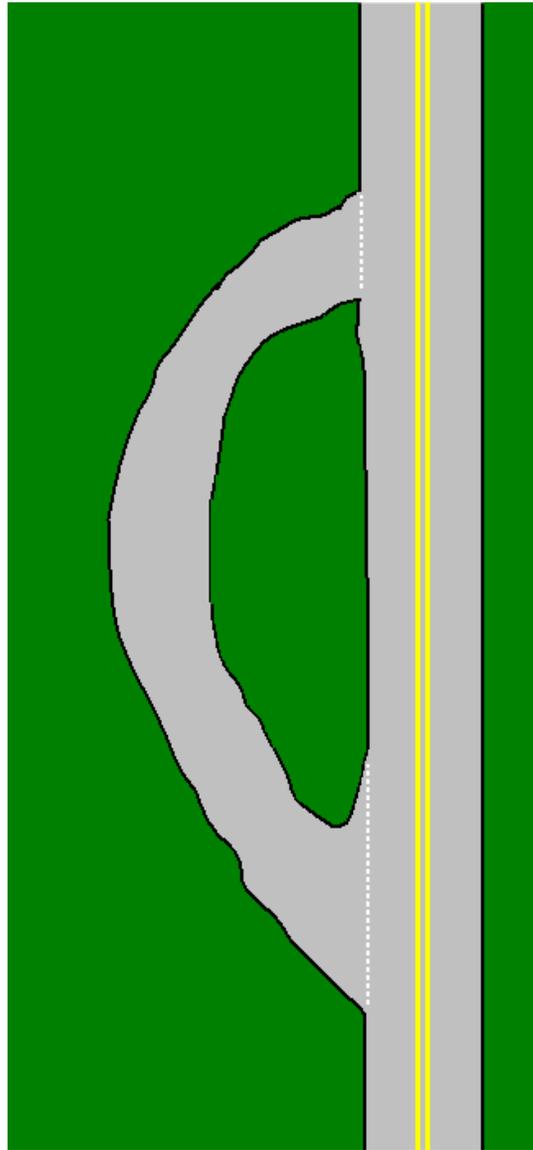
<sup>33</sup> See NCHRP Synthesis 306, p. 85.

<sup>34</sup> See NCHRP Synthesis 306, p. 13.

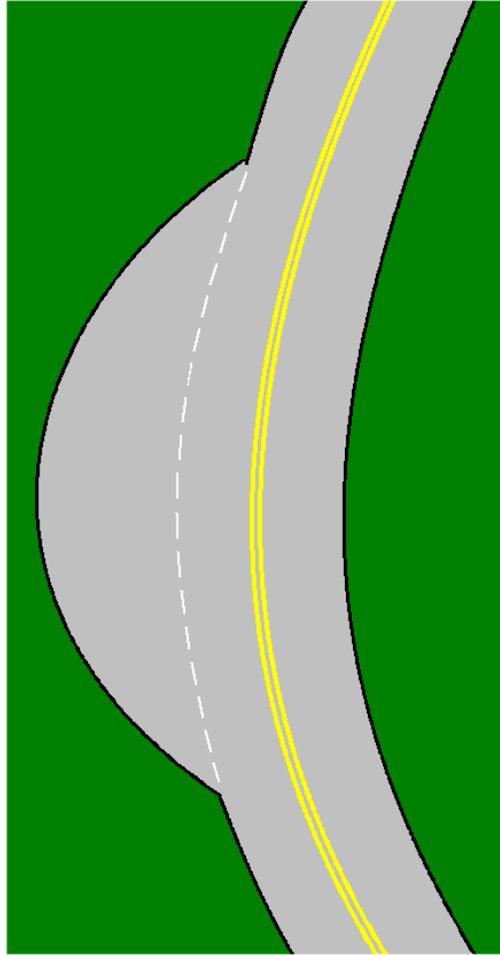
<sup>35</sup> Based upon the most recently available (July 2001) visitor survey information for Shenandoah National Park, the median age of Shenandoah National Park visitors is approximately 41 years old, as compared to a median age of 35.3 years old in the U.S. overall in the 2000 Census.

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**Figure 4-2**  
**Typical Layout of an Existing "Type I" Overlook on Skyline Drive**



**Figure 4-3**  
**Typical Layout of an Existing “Type II” Overlook on Skyline Drive**



The existing method of delineation between Type II overlooks and the roadway, and the current pavement marking, is tolerable when visibility is good. Due care must still be exercised in turning into or from the overlook. There is not much advance warning or signage, and sight distance is often limited and based on a presumed operating speed not exceeding the 35 mph posted speed limit.

The situation is more hazardous, however, when visibility conditions are poor. Despite the fact that motorists are less likely to access the overlooks under poor visibility conditions, the current delineation and pavement marking system gives rise to an expectation of an additional, slower travel lane, particularly for those motorists not thoroughly familiar with the roadway and the overlooks. With a sudden onset of fog (which was experienced during the December 2004 site visit that was used to help formulate these recommendations), the only visual reference that may be visible is the dashed white line, not the shape and form of the overlook or the stone wall along the arc of the overlook. An errant vehicle, operating under the expectation of a slower additional travel lane, typically indicated by a dashed white line, could easily crash into another vehicle parked at the overlook or through the stone wall. Since these are historic dry-laid stone walls, and

do not have a concrete core, the errant vehicle would not be redirected as with a guardrail back to the roadway, but could vault the overlook.

Our recommendation for a continuous milled rumble strip will provide the necessary auditory and vibratory input to the motorist – in particular under low visibility conditions – to address this hazardous condition. Milled rumble strips are suggested (rather than rolled) since the vibratory and auditory input is approximately 12.6 and 3.4 times greater respectively, and the milling can be done on both old and new pavements.<sup>36</sup> Motorists are quite familiar now with continuous shoulder rumble strips of this type along rural highways and interstates, and their application has proven effective in reducing run-off-the-road accidents due to fatigue, inattention or loss of control.

It is also important to point out that this recommendation should have minimal, if any, adverse visual or aesthetic impact. The milled rumble strip is not visible by motorists from the roadway because of the acute observer angle. They may be only minimally visible by pedestrians at the overlook and stone wall. They are only completely visible in plan form, i.e., from a 90°-observer angle looking straight down at the strip.

#### **Enhanced Pavement Markings at Type II Overlooks**

It is recommended that for Type II overlooks with sight restrictions, the existing dashed pavement marking be removed to provide an enhanced delineation of the entrance and exit threshold(s), and that the solid pavement marking edge line for the segment with sight distance limitation be increased in width from the current 4 inches to 6 inches (100 mm to 150 mm). This concept-design is illustrated in Figure 4-4. Note that Figure 4-4 also displays, as recommended above, a continuous rumble strip to delineate and separate the overlook from the roadway. The removal of the existing dashed pavement marking, and the widening of the edge line for the sight-restricted segment, will substantially improve driver recognition of the entrance and exit threshold(s) by achieving higher delineation via negative contrast. The contrast ratio of the target to a background is an essential determinant of target recognition. In this case, it is critical that motorists quickly recognize where the entrance and exit threshold(s) to the Type II overlook are located. Hesitancy in recognition increases the hazards for rear-end and turning movement collisions. This recommendation is also consistent with the design principle for a minimalist philosophy of signage and pavement marking endorsed by the Shenandoah NPS staff.

#### **Use of a Rumble Area at the Approaches to Type I Overlooks**

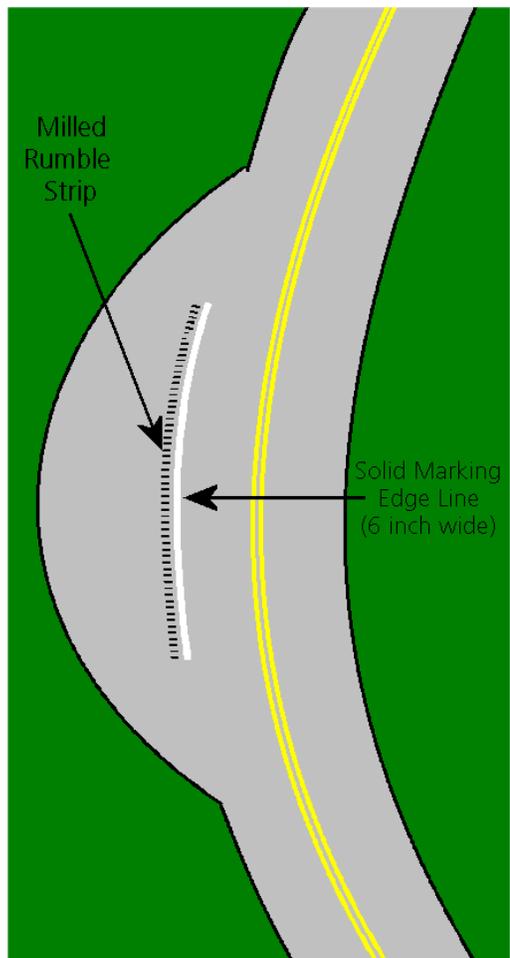
It is recommended that a 'rumble area' consisting of an exposed aggregate macadam (which would be historically contextual) be placed within each directional travel lane at the approaches to the Type I overlooks, and that a stone-inlaid strip be used to delineate the entrance and exit thresholds for the Type I overlooks. Both the 'rumble area' design concept and the stone-inlaid strip at the entrance and exit thresholds for the Type I overlook are illustrated in Figure 4-5. This design treatment addresses three issues. These are (1) limited sight distance with respect to vehicle turning movements into and from the overlooks, (2) relatively high approach speeds, and (3) the difficulty in identifying the entrance point or threshold to the Type I overlook. The latter issue poses a higher than necessary risk of rear-end and turning-movement collisions. The 'rumble area' concept provides the necessary auditory and vibratory input to alert approaching motorists to a change in character and alignment for the roadway, and to the presence of the overlook. There is a concomitant slight reduction in approach speeds as well, which will facilitate a better match between required safe stopping distance and the available sight distance for turning vehicle movements. We would recommend that the 'rumble areas' in each direction (each the width of the travel lane) extend for 515 feet, terminating at the existing signage for the overlook.

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<sup>36</sup> See URL <[http://www.fhwa.dot.gov/safety/fourthlevel/rumble/types\\_mill.htm](http://www.fhwa.dot.gov/safety/fourthlevel/rumble/types_mill.htm)>. See also D. Harwood, *Use of Rumble Strips to Enhance Safety*, NCHP Synthesis of Highway Practice 191, 1993.

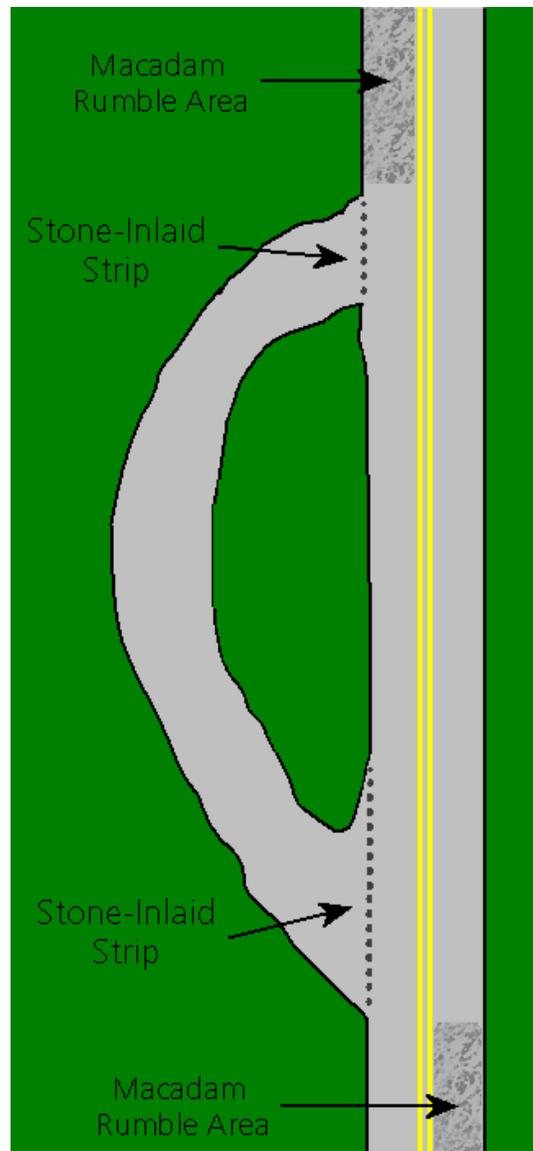
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**Figure 4-4**  
**Proposed Enhanced Pavement Markings and Milled Rumble Strip at “Type II” Overlooks**



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**Figure 4-5**  
**Proposed Macadam Rumble Area and Stone-Inlaid Rumble Strip at "Type I" Overlooks**



This distance will provide a minimum 10 second warning time at the 35 mph approach speed, and may induce a 3 mph to 5 mph speed reduction. The stone-inlaid strip at the entrance/exit thresholds will provide clear, unambiguous delineation of where to turn to access the overlook from the travel lanes of Skyline Drive.

We suggest use of exposed aggregate macadam for the rumble areas, although maintenance issues may require that exposed aggregate concrete be used instead of the macadamized surface.<sup>37</sup> The exposed hard durable aggregates should have a 30-50 mm exposure. This is enough of an incentive to slow vehicles down (and provide the requisite auditory and vibratory input as part of the alerting function) without making them a safety hazard in their own right.<sup>38</sup> A description of macadam types are presented in Table 4-1, and schematic representations of various macadam types are presented in Figure 4-6.

**Table 4-1**  
**Description of Macadam Types**

Source: Best Practice Guide: Part 4 "Slurrybound and Composite Macadam"

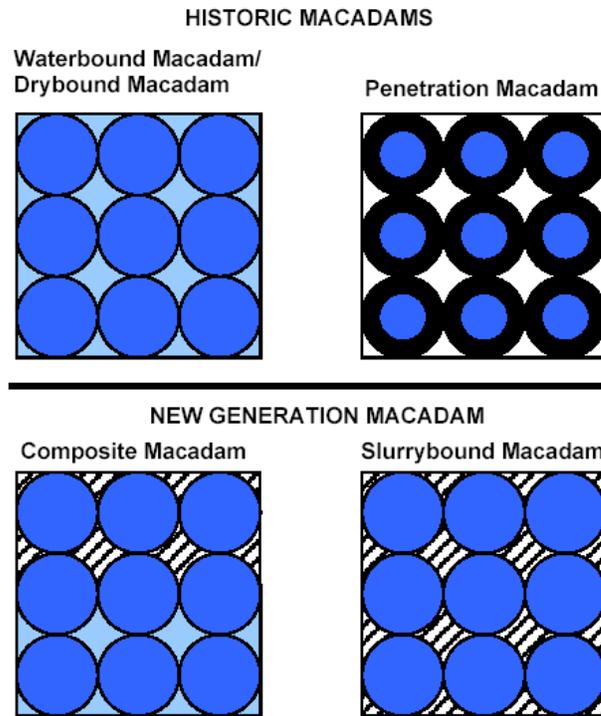
| Type of Macadam                 | Description  |
|---------------------------------|--|
| <b>Drybound Macadam (DM)</b>    | The coarse aggregate first needs to be interlocked using appropriate rollers. Cohesionless fine filler is then vibrated into the voids without the use of water.   |
| <b>Waterbound Macadam (WM)</b>  | The coarse aggregate also needs to be interlocked using the appropriate rollers whereafter water may be used to slush the filler into the voids. The filler may be slightly plastic.   |
| <b>Penetration Macadam (PM)</b> | Interlock of the coarse aggregate needs to be achieved using the appropriate rollers whereafter a hot tar or bitumen is poured over the coarse aggregate layer coating the large aggregates. The voids are not filled completely by the tar or bitumen.                                    |
| <b>Slurrybound Macadam (SM)</b> | The coarse aggregates are only orientated by means of light pedestrian type rollers or plate compactors. A slurry, produced from sand and bitumen emulsion, is forced into the voids between the coarse aggregate until the voids are filled using the same light pedestrian type rollers. |
| <b>Composite Macadam (CM)</b>   | Consists of a lower portion of dry- or waterbound Macadam and a top portion of slurrybound Macadam.  |

<sup>37</sup> For the original description of the roadway and its construction, see H. Benson, "The Skyline Drive: A Brief History of a Mountaintop Motorway," *The Regional Review*, Vol. IV, No. 2, February 1940; both the Table and Figure are from a South African Design Manual which currently uses macadamized road surfaces for low and intermediate-speed roads; the relevant section of the design manual is at URL <<http://www.cidb.org.za/initiatives/Part%204-8-slurry%20bound.pdf>>

<sup>38</sup> See, e.g., application at Palm Cove north of Cairns, Queensland Australia, described in Road Note 64, February 2003 at URL <<http://www.concrete.net.au/search.php?category=Roads%20and%20residential%20streets&menu=4>>

**Figure 4-6**  
**Schematic Representation of Macadam Types**

Source: Best Practice Guide: Part 4 "Slurrybound and Composite Macadam"



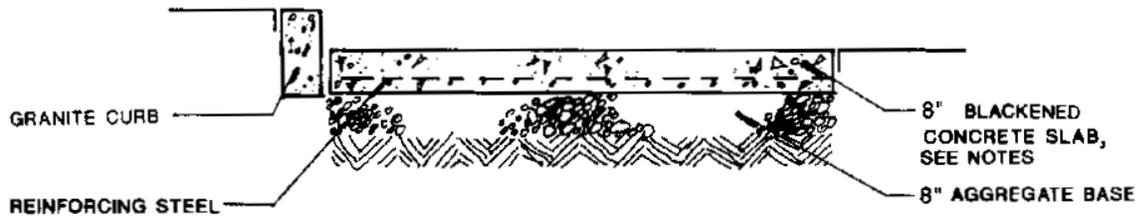
#### **Use of a Bus Pad at Type I Overlooks**

It is recommended that at Type I overlooks which have sufficient area to accommodate larger vehicles, specialized bus loading facilities consisting of a concrete bus pad with dimensions 9' width x 50' length be installed and located adjacent to the pedestrian walkway at the midpoint of the chord that defines the stone wall arc of the overlook. Pavements used by buses need to be stronger than those used exclusively by automobiles, since bus axles typically apply heavier loads onto the pavement than the heaviest loaded semi-trailer axles found on the road. Asphalt has a tendency to move or flow, and eventually rut, under the stationary load of even an empty bus.<sup>39</sup> Therefore, the concept-design proposes a 'bus pad', dimensioned at 9' width x 50' length, to accommodate organized groups using intercity tour bus motor coaches, with slab thickness equal to 8 inches over an 8 inch aggregate base.<sup>40</sup> Figure 4-7 illustrates the concept-design for this type of bus pad.

<sup>39</sup> See URL <[http://www.cement.org/transit/tr\\_cs\\_intermodal.asp](http://www.cement.org/transit/tr_cs_intermodal.asp)>

<sup>40</sup> See *Streetscape Manual for National Mall*, developed by interagency committee including the National Park Service and the National Capitol Planning Commission, at URL <<http://www.nps.gov/streetscape/manual.pdf>>

**Figure 4-7**  
**Bus Pad Cross Section Concept Design**



The bus pad would be in-laid within the existing pavement circulation area of the overlook. To avoid additional vertical signage that would impact the view from the overlook, signage could consist of the word *BUS* in stones (local material matching the stones in the wall) in-laid on the bus pad. This signage indicates that buses – ATS shuttle buses and charter tour buses – should load and unload passengers at the bus pad location.

The site location on the midpoint of the chord that defines the stone wall arc of the overlook is critical. Discussion with NPS staff at Shenandoah indicated that parking of vehicles - particularly for overlooks with no marked stalls – is generally random. By reserving this central location for priority vehicles – ATS shuttle buses and tour buses used by organized groups – and enforcing this restriction, this accomplishes the following. It forces the other vehicles, even if still randomly distributed, to use the fore and aft sections along the stone wall or the area adjacent to the median for parking. This therefore keeps the central part of the viewshed – for pedestrians congregating in the overlook and for passing motorists along Skyline Drive- open when the bus pad is *not* in use.

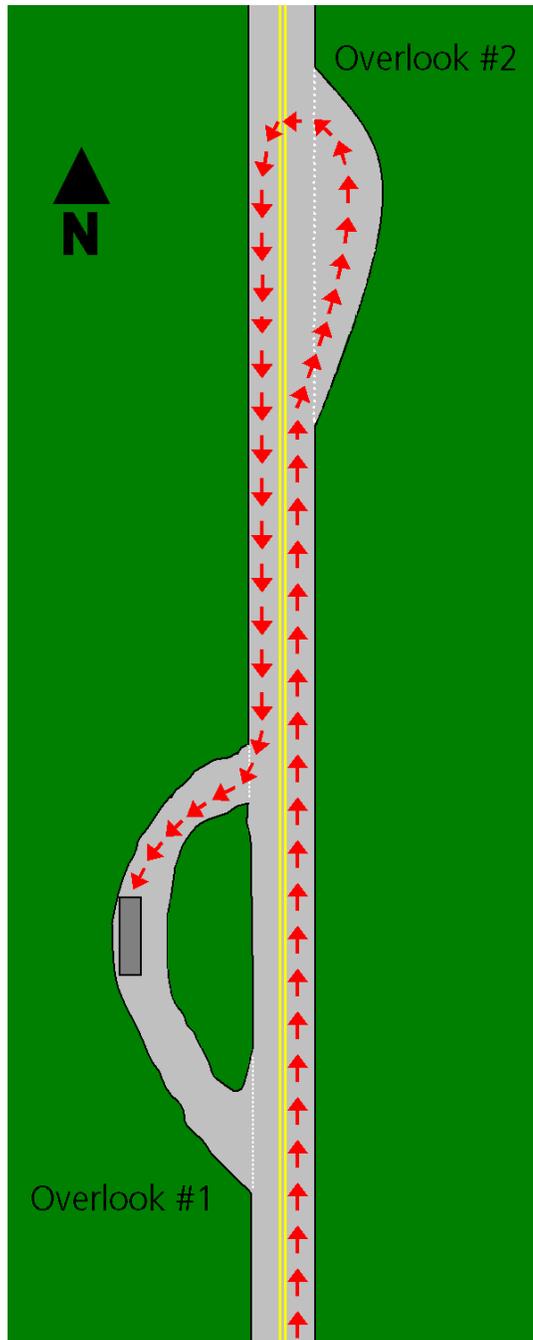
#### **Right-Turn Access Only for Large Vehicles at Type I Overlooks**

It is recommended that the National Park Service staff at Shenandoah strongly encourage (and perhaps mandate for ATS service controlled by the National Park Service) right-turn access only for large vehicles (ATS, tour bus, etc.) to Type I overlooks with bus loading facilities. Operational routing in both directions that would allow right-turn access only for large vehicles to the designated Type I overlooks with special bus loading facilities is illustrated in Figure 4-8. In the figure, a northbound bus on Skyline Drive wanting to access Overlook #1 proceeds north past Overlook #1 to Overlook #2, makes right turn into Overlook #2, reverses direction and proceeds south on Skyline Drive, and then makes a right turn into Overlook #1.

Right-turn access only achieves several benefits. It is a less hazardous operation, avoiding the necessity to cross an opposing traffic stream under limited sight distance, which characterizes traffic operations near overlooks on much of Skyline Drive. It also places passenger loading and unloading of the buses adjacent to the walkway along the stone wall<sup>41</sup>, achieving conflict separation with other standing and circulating vehicles within the overlook. The negative aspect of this operational restriction is that buses may have to travel slightly longer to the next overlook on the opposite side of Skyline Drive to turnaround and reverse direction.

<sup>41</sup> Note that buses that may be used for ATS service and intercity motor coaches have right-sided doors only. In addition, right-sided access of the busses would allow reconstruction of the walkway along the stone wall to provide adequate ADA-compliant clear space and an accessible path for the operation of wheelchair lifts and the mobility of wheel chair users. It would not be desirable to operate wheel-chair lifts in the middle of the circulation area of the overlook.

Figure 4-8  
Right-Turn Access Only for Large Vehicles at Type I Overlooks



## Chapter 5: Transportation Data for Planning

*This section provides an overview of available transportation data that may be of use in support of potential future updates of the General Management Plan for Shenandoah National Park.<sup>42</sup> To help support these potential future updates, this chapter identifies existing transportation-related data and identifies potential transportation data needs for possible subsequent alternative transportation-planning and park-planning efforts.*

### Introduction

The section in the existing General Management Plan (GMP) for Shenandoah National Park (January 1983) consists of approximately one half of one page along with a map showing a general overview of regional transportation facilities including highways, airports, and passenger railroad lines.<sup>43</sup> In general, although Shenandoah does not now experience widespread or pervasive transportation-related problems, future trends in visitation growth related to local and national economic factors, growth in surrounding year-round development, technological advancements, and resource conditions are likely to be addressed in upcoming General Management Plan updates.

### An Overview of the Transportation Planning Process

Transportation planning in the region surrounding Shenandoah National Park occurs within the context of a well established set of federal, state and regional transportation planning processes. Because an understanding of these processes may be useful in developing future GMP updates related to transportation, an overview of these transportation planning processes is presented below.

Federal highway and transit statutes require, as a condition for spending federal highway or transit funds in urbanized areas, the designation of metropolitan planning organizations (MPOs) which have responsibility for the planning, programming and coordination of federal highway and transit investments using the “continuing, comprehensive, and cooperative” (3C) transportation planning process.

MPOs must coordinate with the state and local public transit operators and define each organization’s responsibilities. Areas with Federal public lands and/or Indian tribal areas must include these agencies in their planning. The MPO process is designed so as to encourage multi-modal analysis of transportation problems, public involvement, and the consideration of both long-range and short-term needs and strategies.

#### *Metropolitan Transportation Planning and Programming*

The metropolitan transportation planning process (see Title 23, CFR, Part 450, Subpart C) includes the development of a regional long-range transportation plan that has at least a 20-year planning horizon, that is reviewed and updated at least every three years in air quality nonattainment and maintenance areas and at least every five years in air quality attainment areas, and that must be approved by the metropolitan planning organization (MPO) in the metropolitan planning area addressed by the plan. In air quality nonattainment and maintenance areas, an air quality conformity determination must be made by FHWA, FTA and the MPO on any revised or new regional long-range transportation plan, in accordance with the Clean Air Act and Environmental Protection Agency (EPA) regulations.

In addition to the development of a metropolitan long-range transportation plan, the metropolitan transportation planning process includes the development of a regional

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<sup>42</sup> *General Management Plan. Development Concept Plan. Shenandoah National Park, Virginia.* January 1983.

<sup>43</sup> *General Management Plan. Development Concept Plan. Shenandoah National Park, Virginia.* January 1983. Page 9.

transportation improvement program (TIP) by the MPO in cooperation with the state and regional public transit operators. The regional TIP is a staged, multiyear, intermodal program of transportation projects that is developed to be consistent with the regional long-range transportation plan, and that includes a priority list of projects to be carried out in each year of the TIP. Regional TIPs have a planning horizon of at least three years, but may cover a longer period if transportation priorities and financial information are properly identified within the TIP for the additional years. Regional TIPs are reviewed and updated at least every two years, and as with the regional long-range transportation plan, in air quality nonattainment and maintenance areas, an air quality conformity determination must be made by FHWA, FTA and the MPO on any revised or new regional TIP, in accordance with the Clean Air Act and Environmental Protection Agency (EPA) regulations.

Each MPO is responsible for setting up its own processes for meeting federal regulations, prioritizing projects, and obtaining federal funds. MPO boards and sub-committees generally consist of representatives from local cities and counties, transit authorities and state agencies and other regional planning organizations. Analysis and day-to-day program management are done by MPO technical staff. The MPO process tries to unify and prioritize transportation planning within a geographic area based on financial considerations. This organization provides additional technical and administrative assistance to the various transportation organizations, but also requires additional planning efforts and competition between projects.

#### *Statewide Transportation Planning and Programming*

The statewide transportation planning process (see Title 23, CFR, Part 450, Subpart B) includes the development of a statewide long-range transportation plan that addresses all transportation modes in all areas of the state and that has at least a 20-year planning horizon. The statewide long-range transportation plan is required to be continually evaluated and periodically updated. Because the statewide long-range transportation plan is carried out in coordination with the regional long-range transportation plans within the state, in practice the statewide long-range transportation is reviewed and updated at least every three years.

In addition to the development of a statewide long-range transportation plan, the statewide transportation planning process includes the development of a statewide transportation improvement plan (STIP) by the state. The STIP is a staged, multiyear, statewide, intermodal program of transportation projects which is developed to be consistent with the statewide long-range transportation plan and statewide transportation planning processes, and with metropolitan long-range transportation plans, metropolitan TIPs and metropolitan transportation planning processes. The STIP includes a priority list of projects to be carried out in the first three years of the STIP. STIPs have a planning horizon of at least three years, but may cover a longer period, whereby information provided for the time frame beyond the required three years is considered for informational purposes only, rather than for project prioritization purposes.

STIPs are reviewed and updated at least every two years, and as with the regional long-range transportation plan, in air quality nonattainment and maintenance areas, an air quality conformity determination must be made by FHWA, FTA and the MPO on any revised or new regional TIP, in accordance with the Clean Air Act and Environmental Protection Agency (EPA) regulations.

#### *Relationship of MPO TIPs and the Statewide TIP*

Metropolitan TIPs are included without modification in the STIP, either directly or by reference, once the metropolitan TIP is approved by the MPO and after any necessary air quality conformity findings have been made. In addition to projects from metropolitan TIPs, STIPs include projects in rural areas of a state that lie outside of metropolitan areas and are therefore not covered under a metropolitan TIP, and also include all federally-funded projects (including, for example, those

funded under the Federal Lands Highway Program (FLHP)). The STIP also contains regionally significant transportation projects that do not receive federal funding, particularly those that otherwise may require action by FHWA or FTA (e.g., addition of an interchange to the Interstate System using only state and local funds). STIPs are also consistent with metropolitan and state transportation plans.

#### *Relationship of NPS Transportation Planning and Programming to Statewide and Metropolitan Transportation Planning and Programming*

For national park transportation projects, it is important for NPS staff to establish interagency coordination with the local MPO (or the state, if the park is not within with boundaries of an MPO) early in the planning process. Parks should initiate early consultation with the MPO or state to identify projects, learn of agency processes and criteria, and conduct appropriate public and stakeholder involvement. The National Park Service, as well as other federal land management agencies, are also required to develop a TIP in the same way that states and metropolitan areas are required to. The NPS TIP is prepared in coordination with the FLHP TIP, and FLHP TIP elements are then incorporated into the appropriate metropolitan TIPs and statewide TIPs throughout the country. Park staff need to understand the MPO and state timelines and constraints concerning the timing of park planning projects. The relationships among the various elements of statewide, metropolitan and National Park Service transportation planning are presented in the figure below.

The park service organization and its geographic character has lead to a slightly different transportation planning and programming structure than that pursued by states and metropolitan areas. Since each park is geographically independent (although some are in close proximity to each other), each park completes its own transportation planning, generally via the General Management Plan (GMP) process in conjunction with requests submitted to the NPS Project Management Information System (PMIS), often with technical support from NPS headquarters to the park in the form of a Transportation Assistance Group (TAG). Proposed projects are then sent to the regional office where they are prioritized against the needs of other parks.

#### **Roadway and Traffic Data**

Access to Shenandoah National Park as well as travel within the park is accomplished primarily by private automobile. The four primary roadways that lead to the entrances of the park are U.S. Route 340 at the Front Royal Entrance Station at the northern end of the park, U.S. Route 211 at the Thornton Gap Entrance Station, U.S. Route 33 at the Swift Run Gap Entrance Station, and Interstate Route 64 (I-64) at the Rockfish Gap Entrance Station at the southern end of the park and the northern end of the Blue Ridge Parkway (see Figure 5-1). Traffic count information for these roadways is available from the Virginia DOT at a relatively detailed geographic level.<sup>44</sup> Also, planning information concerning near-term and long-term plans for these roadways and other major roadways in the state of Virginia is available from the Virginia DOT.<sup>45,46,47</sup> Virginia DOT data is often organized according to the nine VDOT Districts into which the state is divided. Figure 5-2 shows the two Virginia DOT districts that are located in the Shenandoah region. Traffic counts within Shenandoah National Park along Skyline Drive are available from the FHWA Eastern

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<sup>44</sup> Virginia Department of Transportation. *Traffic Counts*. URL <<http://www.virginiadot.org/comtravel/ct-TrafficCounts.asp>>

<sup>45</sup> Virginia Department of Transportation. *2025 State Highway Plan*. URL <<http://www.virginiadot.org/projects/pr-statehighwayplan.asp>>

<sup>46</sup> Virginia Department of Transportation. *Staunton District Projects*. URL <<http://www.virginiadot.org/projects/district-projects.asp?ID=8>>

<sup>47</sup> Virginia Department of Transportation. *Culpeper District Projects*. URL <<http://www.virginiadot.org/projects/district-projects.asp?ID=7>>

Federal Lands Highway Division.<sup>48</sup> Figure 5-3 presents an overview of traffic trends along Skyline Drive since 1988 based on this data.

Of particular note currently are Virginia DOT plans for I-81. Construction of I-81 in the state of Virginia started in 1957 and was completed in 1971. In Virginia, I-81 passes through 21 cities and towns and 13 counties, and runs approximately parallel to Shenandoah National Park in a northeast-southwest direction approximately 15 miles to the west of the park. Overall, I-81 extends from its southern terminus in eastern Tennessee north through Virginia, West Virginia, Pennsylvania, and New York state to the Canadian border. As a major north-south corridor along the eastern seaboard of the U.S., it is a relatively heavily traveled corridor, with a substantial amount of truck traffic. In most areas along its route, I-81 is four lanes wide (two in each direction).

Traffic volumes on I-81 have more than tripled since 1970, with truck traffic in particular now comprising between approximately 20% and 40% of the vehicle traffic, depending on the particular location on the highway. Increases in truck traffic have led to safety concerns since portions of I-81 are located in mountainous terrain and are subject to relatively frequent fog, rain and snow.

Since 1996, the Virginia Department of Transportation (VDOT) and the Federal Highway Administration (FHWA) have been studying the potential for various improvements to be made along the I-81 corridor in Virginia as part of a comprehensive I-81 corridor study that is meant to address existing and future transportation deficiencies on I-81 and in the corridor.<sup>49</sup> Particular deficiencies being studied include those related to a need for increased capacity, improved safety, and improved roadway geometry in many areas. Potential improvements include widening the highway from four to six lanes (from two to three lanes in each direction), expanding truck stops and rest areas, improving existing interchanges and adding new interchanges, and further use of Intelligent Transportation Systems (ITS). Information regarding VDOT plans for the use of Intelligent Transportation Systems (ITS) statewide<sup>50</sup> and in the I-81 corridor<sup>51</sup> are available from VDOT.

#### *Regional and Local Sources of Roadway and Traffic Information*

##### **Planning District Commissions**

Since 1968, Virginia state law has permitted the formation of Planning District Commissions (PDCs) throughout the state of Virginia.<sup>52</sup> The purpose of Planning District Commissions is to provide assistance to local governments and their citizens concerning issues such as land use planning and regulation, transportation, solid waste management, water and waste water, housing, economic development, water resource management, flood mitigation and human services. Statewide, there are 21 Planning District Commissions throughout Virginia, four of which are located in the Shenandoah region (see Figure 5-4). These include:

*Northern Shenandoah Valley Regional Commission*<sup>53</sup>

URL <<http://www.lfpdc7.state.va.us/intro.html>>

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<sup>48</sup> Federal Highway Administration. Eastern Federal Lands Highway Division. *NPS Traffic Data*. URL <<http://www.epl.fhwa.dot.gov/nps/index.htm>>

<sup>49</sup> Virginia Department of Transportation. *I-81 Corridor in Virginia*. URL <<http://www.virginiadot.org/projects/constSTAN-I81-overview.asp>>

<sup>50</sup> Virginia Department of Transportation. *Smart Travel Virginia*. URL <<http://www.virginiadot.org/infoservice/smart-default.asp>>

<sup>51</sup> Virginia Department of Transportation. *I-81 ITS Projects*. URL <<http://www.vdot.virginia.gov//////////projects/constSTAN-I81Proj-its-projects.asp>>

<sup>52</sup> On March 13, 1968, the General Assembly of Virginia amended Title 15.1, Chapters 34 and 35 of the Code of Virginia to permit the formation of Planning District Commissions (PDCs) throughout the state of Virginia. This amendment, once known as the Virginia Area Development Act, is now known as the Regional Cooperation Act.

<sup>53</sup> Formerly known as the *Lord Fairfax Planning District Commission*.

*Rappahannock-Rapidan Regional Commission (RRRC)*  
URL <<http://www.rrregion.org/>>

*Central Shenandoah Planning District Commission (CSPDC)*  
URL <<http://www.cspdc.org/index.cfm?section=about&page=overview>>

*Thomas Jefferson Planning District Commission (TJPDC)*  
URL <<http://www.tjpd.org/>>

Planning District Commissions are made up of elected officials and citizens appointed to the Commission by members of local governments. Transportation planning is just one of the many roles for PDCs, who are often involved in highway planning and development, ridesharing, airport planning, and transit planning. The Virginia Department of Transportation (VDOT) allocates State Planning and Research (SPR) funding to Planning District Commissions across the state to provide transportation planning assistance to non-urbanized areas within the state of Virginia.

### **Metropolitan Planning Organizations (MPOs)**

In urbanized areas, federal highway and transit statutes require, as a condition for spending federal highway or transit funds in these areas, the designation of metropolitan planning organizations (MPOs) that have responsibility for the planning, programming and coordination of federal highway and transit investments using the “continuing, comprehensive, and cooperative” (3C) transportation planning process. Each MPO is responsible for setting up its own processes for meeting federal regulations, prioritizing projects, and obtaining federal funds. MPO boards and sub-committees generally consist of representatives from local cities and counties, transit agencies and state agencies and other regional planning organizations. Analysis and day-to-day program management are done by MPO technical staff. The MPO process tries to unify and prioritize transportation planning within a geographic area based on financial considerations, and is designed so as to encourage multimodal analysis of transportation problems, public involvement, and consideration of both long-range and short-term needs and strategies. MPOs in the Shenandoah region include:

*Charlottesville-Albemarle MPO*  
URL < <http://www.tjpd.org/transportation/mpo.asp> >

*Harrisonburg-Rockingham MPO (HRMPO) (newly-designated MPO in 2003)*  
URL < <http://www.virginiadot.org/projects/urbanplans/harrisonburg.htm>>

### **Cities and Towns**

Though the majority of highway and roadway data and planning information is available through the Virginia DOT, the regional Planning District Commissions, and Metropolitan Planning Organizations (MPOs), some information may be available directly from the highway or public works departments in the local communities near Shenandoah National Park. The primary communities from which this type of information may be available include:

- Front Royal, on U.S. Route 340 north of the Front Royal Entrance Station
- Luray, on U.S. Route 211 west of the Thornton Gap Entrance Station
- Sperryville, on U.S. Route 211 east of the Thornton Gap Entrance Station
- Elkton, on U.S. Route 33 west of the Swift Run Gap Entrance Station
- Lydia, on U.S. Route 33 east of the Swift Run Gap Entrance Station
- Stanardsville, on U.S. Route 33 east of the Swift Run Gap Entrance Station

In addition to information that may be available directly from cities and towns, the Virginia DOT recently initiated a project to update the transportation plans for small communities across the Commonwealth. Called the “Small Urban Area Transportation Plans” project, it includes updating the transportation plans for 46 "small urban areas" (those towns and cities with populations less than 50,000 people).<sup>54</sup> The plans are to address transportation issues and identify travel needs in each community through the year 2020. Small urban areas in the Shenandoah region for which transportation plans will be updated under this project include:

- Culpeper
- Front Royal
- Luray
- Staunton
- Waynesboro
- Harrisonburg
- Elkton
- Grottoes

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<sup>54</sup> Virginia Department of Transportation. *Small Urban Area Transportation Plans*. URL <<http://www.virginiadot.org/projects/urbanplans/index.html>>

Figure 5-1  
Major Roadways in the Shenandoah Region

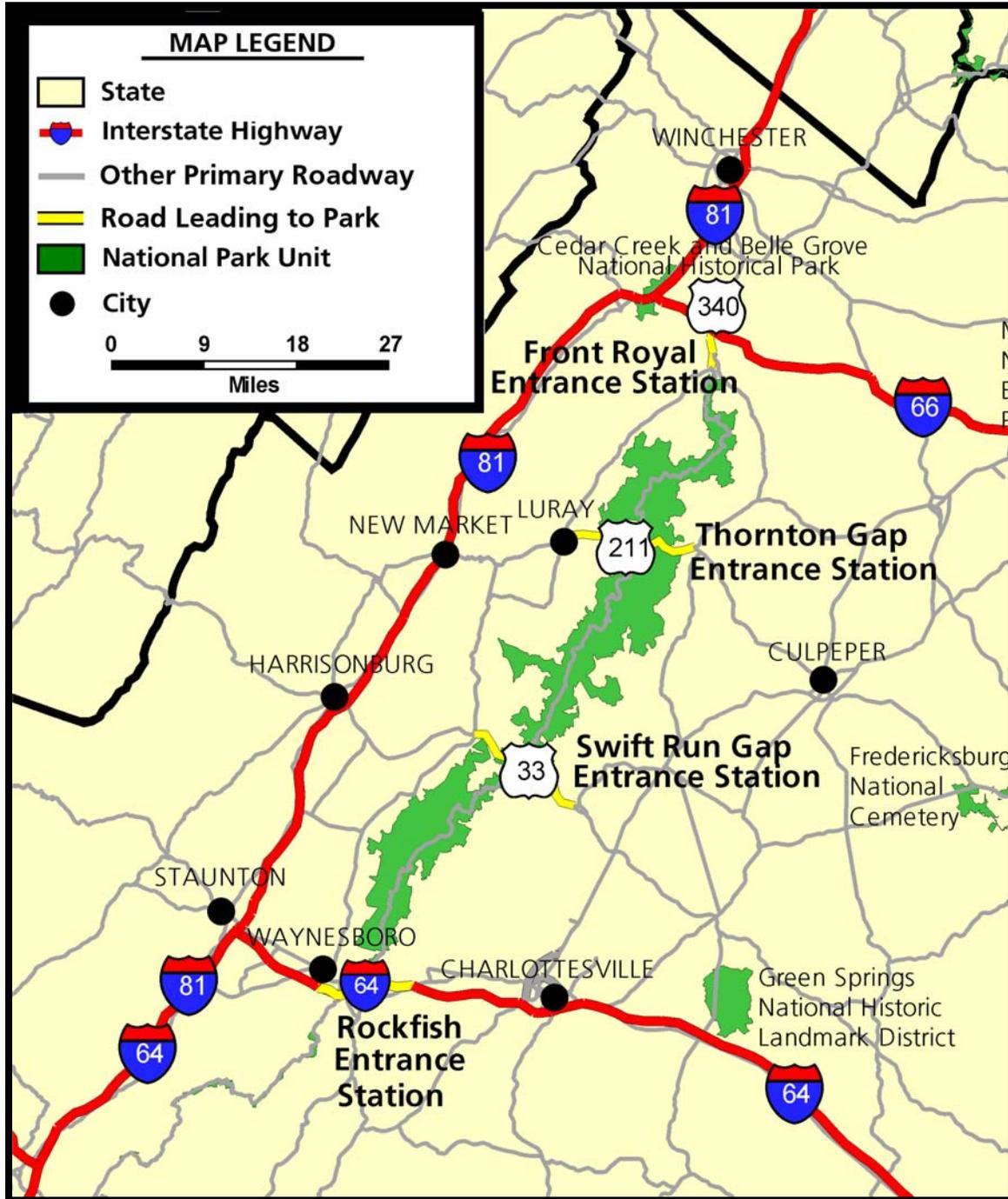
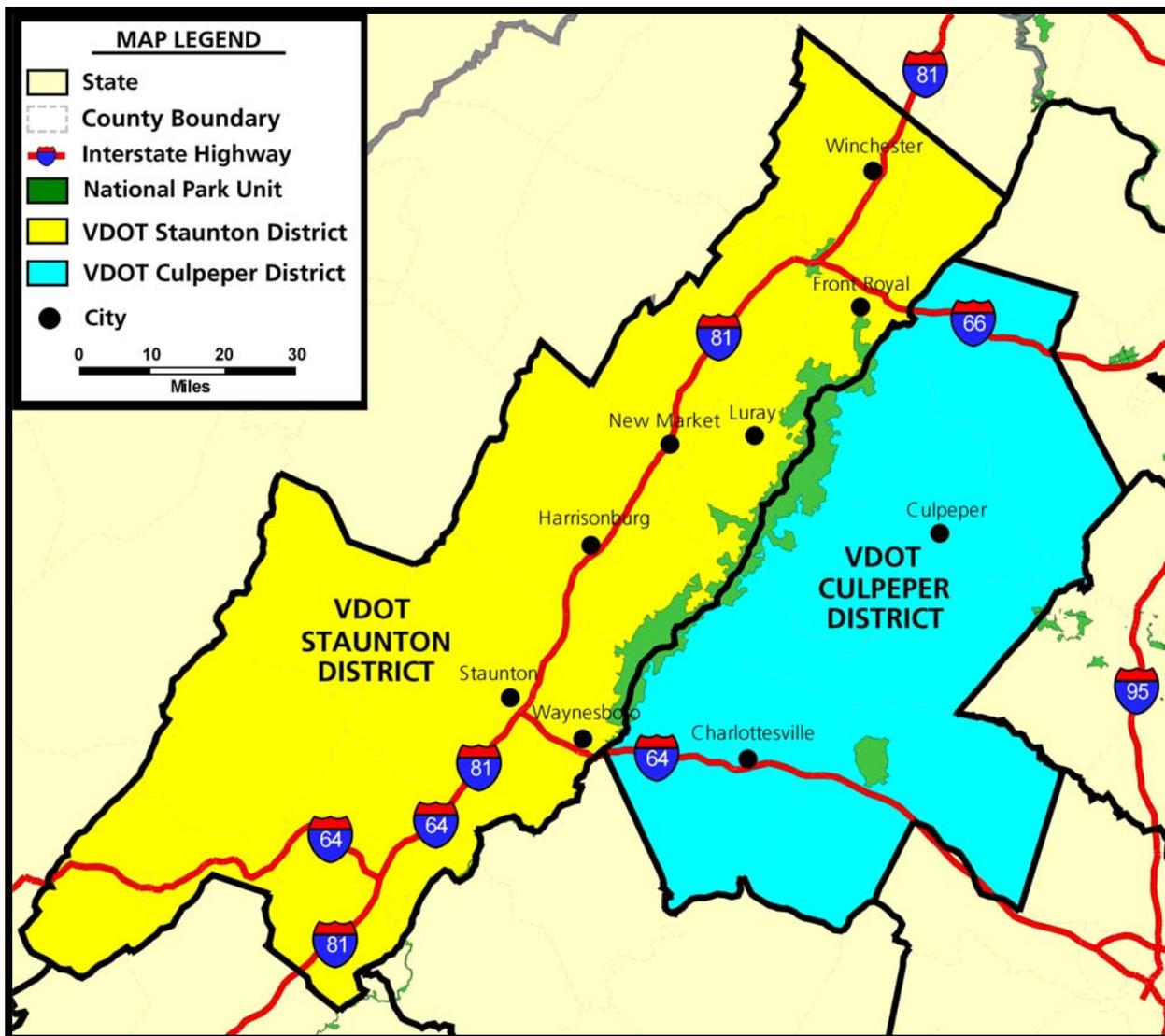


Figure 5-2  
Virginia DOT Districts in the Shenandoah Region



**Figure 5-3**  
**Skyline Drive Traffic Trends**

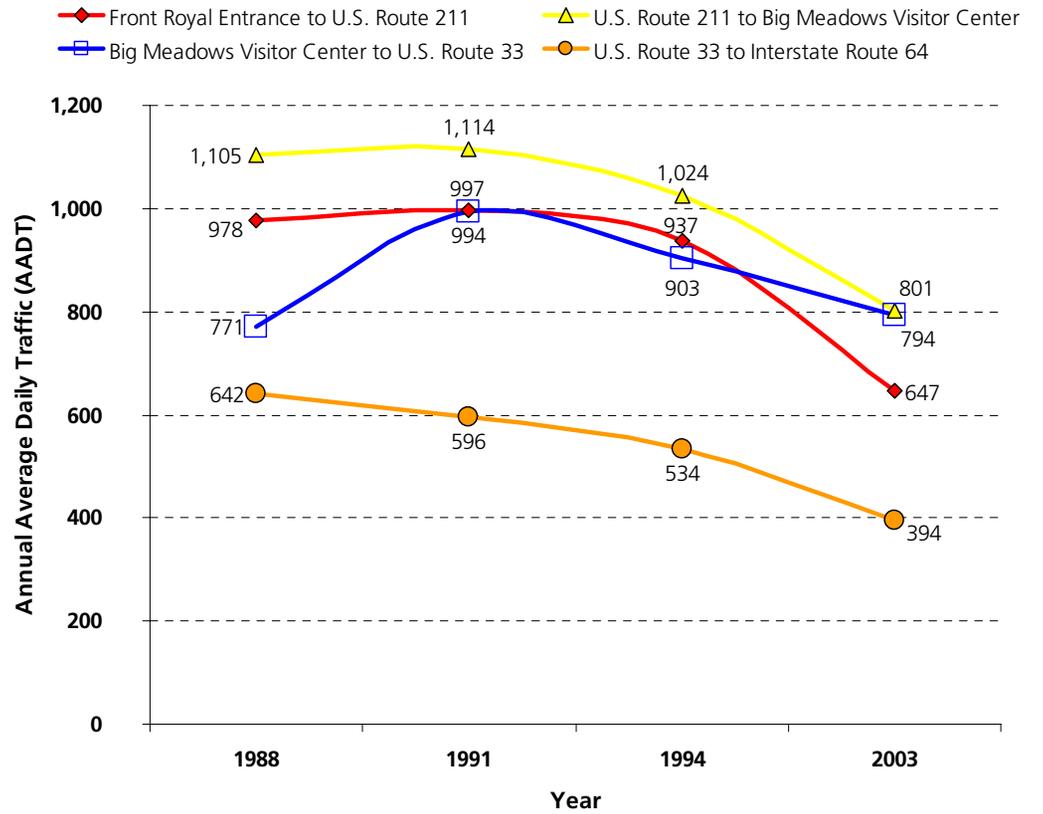
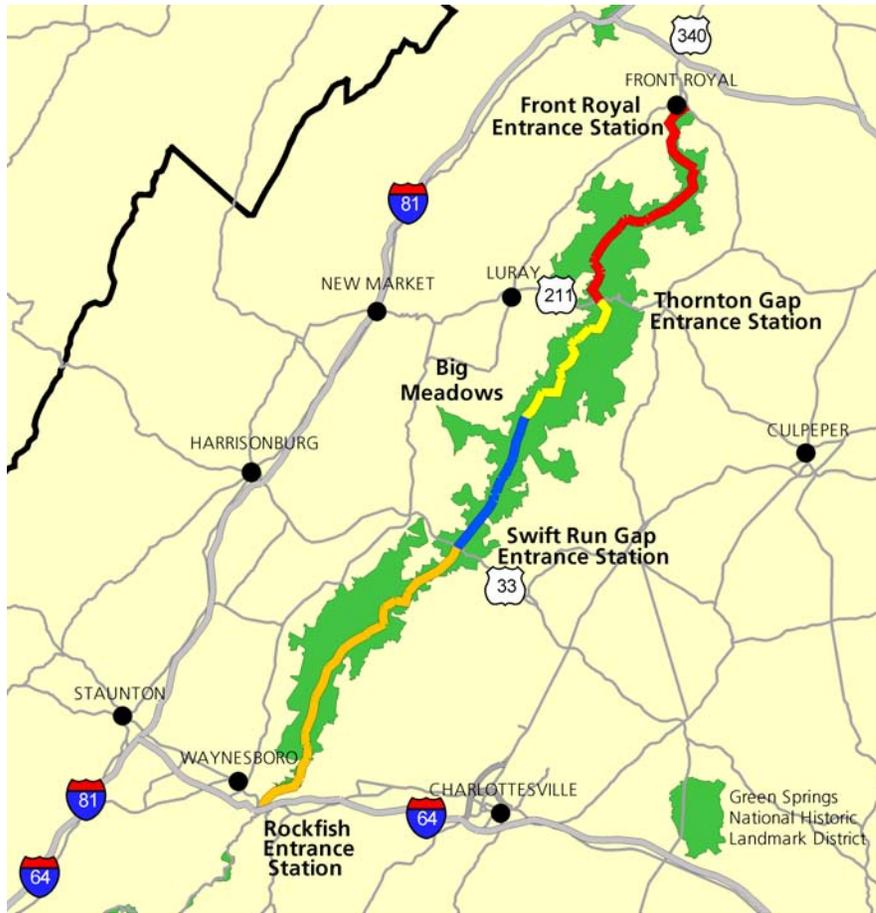
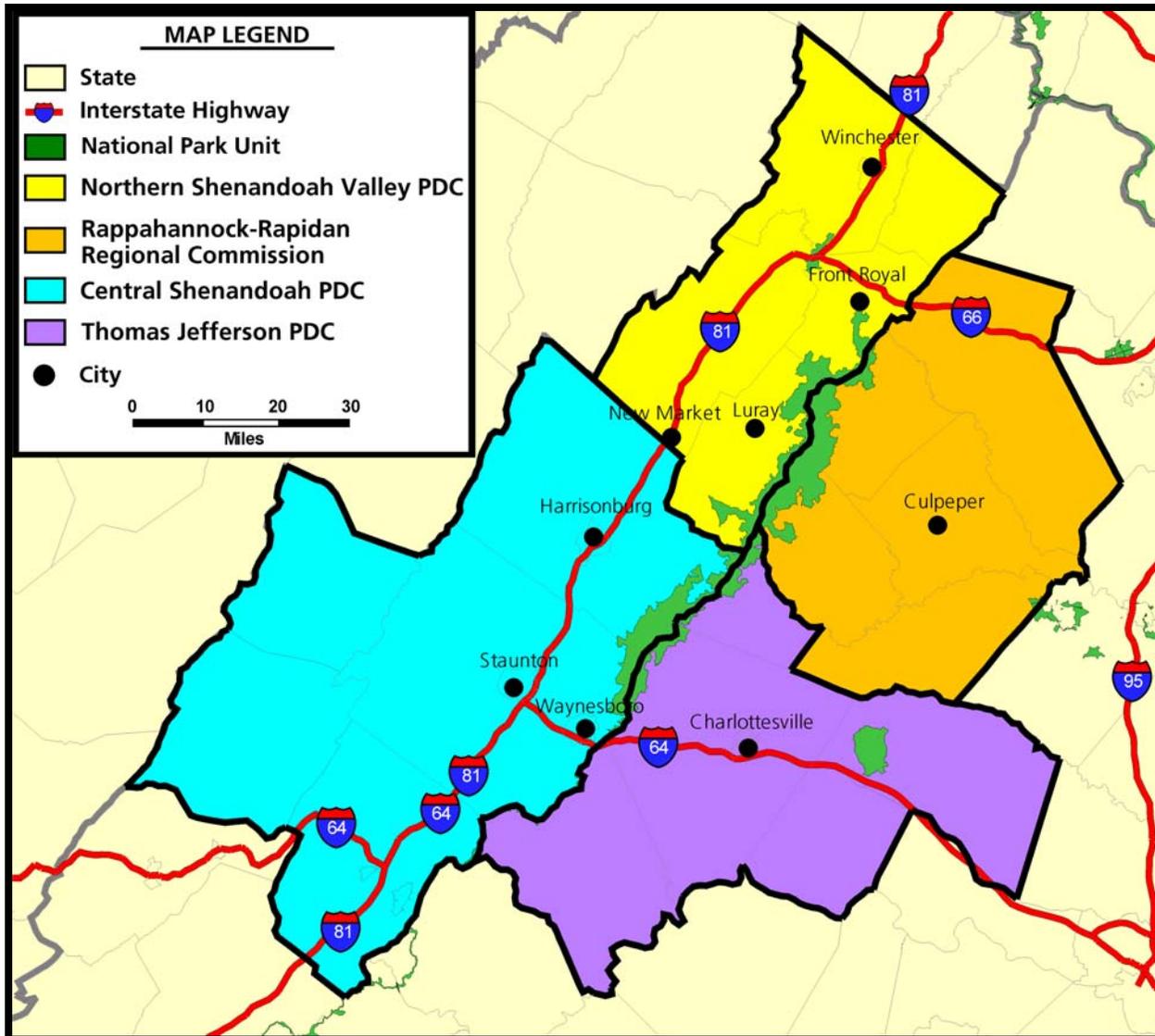


Figure 5-4  
Planning District Commissions (PDCs) in the Shenandoah Region



### Passenger Rail Service (Amtrak)

Intercity rail service within, to and from the state of Virginia is operated by Amtrak, which operates over approximately 715 miles of right-of-way throughout the state of Virginia. Amtrak provides service to 21 stations in the state of Virginia, with the closest stations to Shenandoah National Park located in Charlottesville, Staunton, and Culpepper (see Figure 5-5). Each of these three stations is located approximately 15 to 25 miles from the nearest entrance station to Shenandoah National Park. Amtrak routes serving the stations in Charlottesville and in Culpepper include the *Cardinal* (operating between New York City and Chicago) and the *Crescent* (operating between New York City and New Orleans). Amtrak routes serving the station in Staunton include only the *Cardinal*. The *Cardinal* operates three times per week from New York to Chicago, and the *Crescent* operates daily. For calendar year 2000 (the most recent detailed ridership data that could be obtained), total passenger boardings were 72,623 on the *Cardinal* and 271,244 on the *Crescent*. Total passenger boardings and passenger alightings at the three Amtrak stations closest to Shenandoah National Park were as follows:

#### Charlottesville

*boardings:* 19,519  
*alightings:* 9,288

#### Culpeper

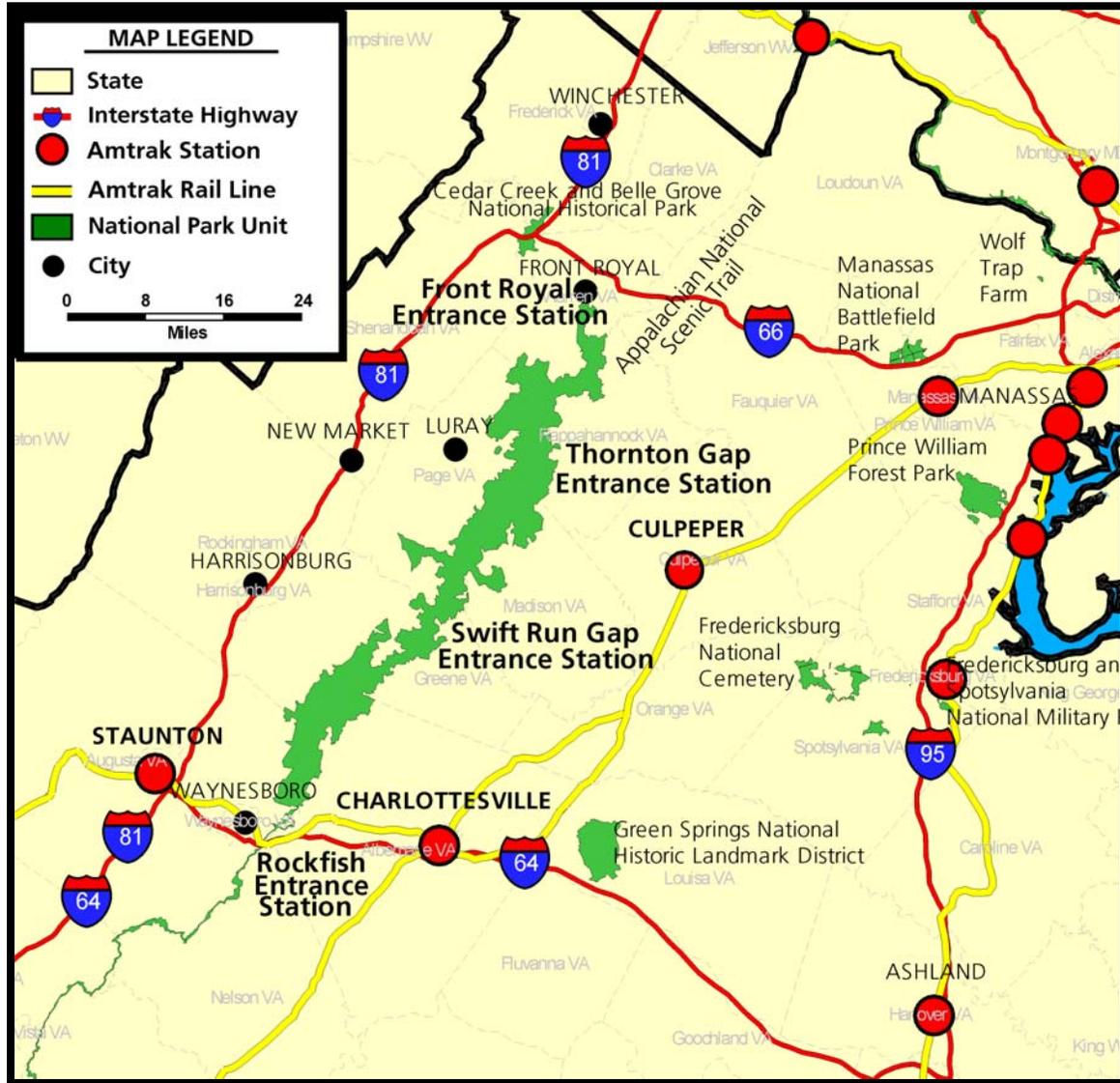
*boardings:* 1,891  
*alightings:* 512

#### Staunton

*boardings:* 1,240  
*alightings:* 2,978

Charlottesville is by far the most heavily patronized of the three stations. Major destinations of passengers boarding at Charlottesville include Washington D.C., New York City, Philadelphia and Staunton VA. Major origins of passengers alighting at Charlottesville include Chicago, Atlanta, Alexandria VA, Cincinnati and Baltimore.

**Figure 5-5**  
**Amtrak Passenger Rail Service in the Shenandoah Region**



## Transit Data

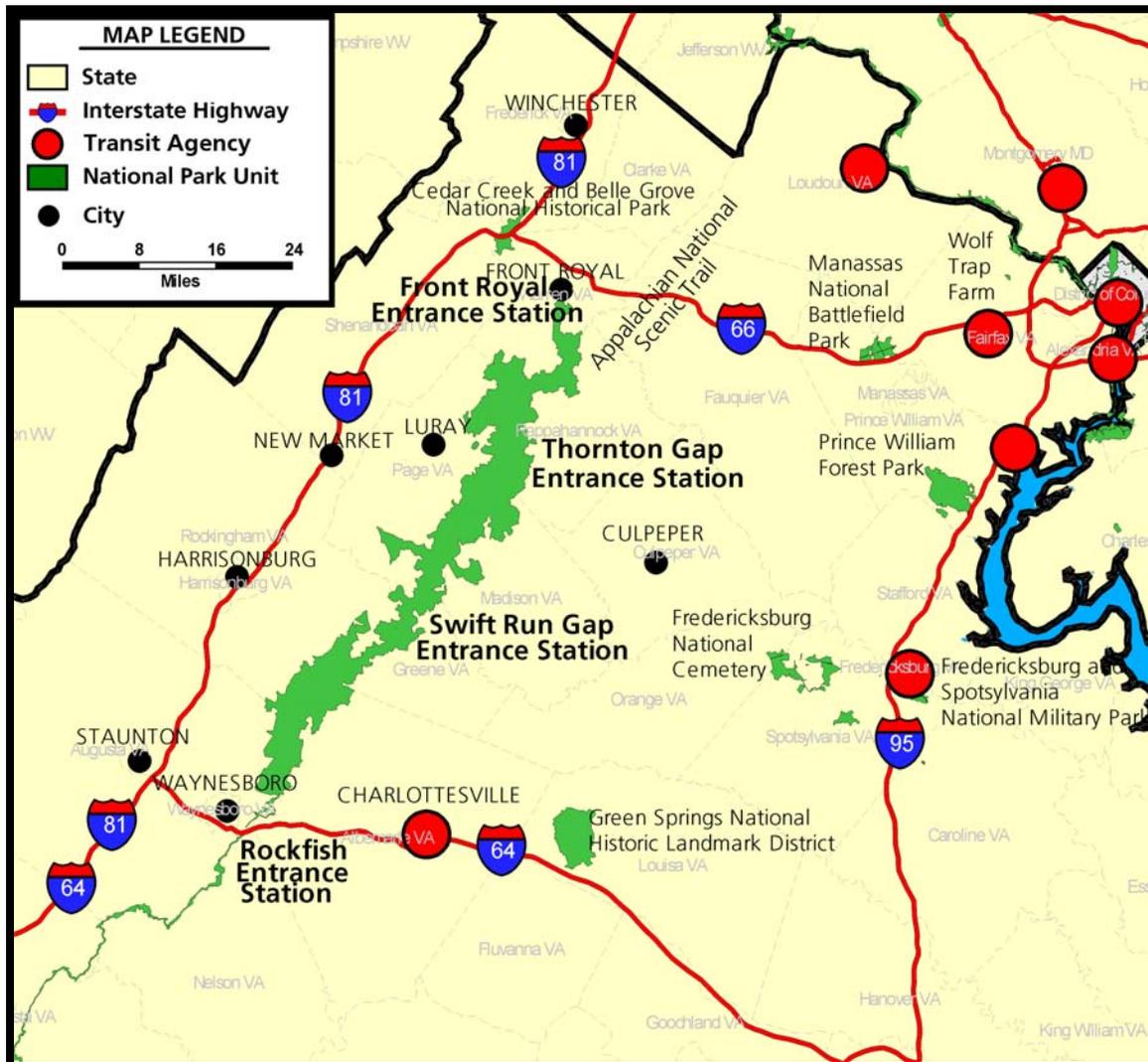
Though there are no transit bus or transit shuttle services currently serving the park or operating through the park, some national parks work with local transit agencies to coordinate and adjust existing public transit services serving park areas or introduce new public transit services to serve park areas. Transit agencies in the Shenandoah region can be identified using data from the National Transit Database (NTD) produced by the Federal Transit Administration (FTA).<sup>55</sup> The NTD is the FTA's primary national database for statistics on the transit industry. Recipients of FTA's Urbanized Area Formula Program (Section 5307) grants are required by statute to submit data to the NTD. There are approximately 600 transit operators nationwide that currently report data annually to the FTA National Transit Database. The data consist of selected financial and operating statistics that describe various aspects of the public transit service provided by each transit agency. According to the NTD, the only transit service in the Shenandoah region is that operated by the Charlottesville Transit Service (CTS)<sup>56</sup> in Charlottesville, approximately 20 miles east of the southern entrance to the park (see Figure 5-6). There are approximately 1.2 million total annual passenger boardings on approximately ten major transit bus routes in the Charlottesville area and Albemarle County that are operated by CTS. Passenger fares are 75 cents per passenger boarding.

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<sup>55</sup> U.S. Department of Transportation. Federal Transit Administration. *National Transit Database*. URL <<http://www.ntdprogram.com/NTD/ntdhome.nsf/?Open>>

<sup>56</sup> Charlottesville Transit Service (CTS). URL <<http://www.charlottesville.org/default.asp?pageid=69BA9DD5-8CF7-4591-90EC-919ACDA784D1>>

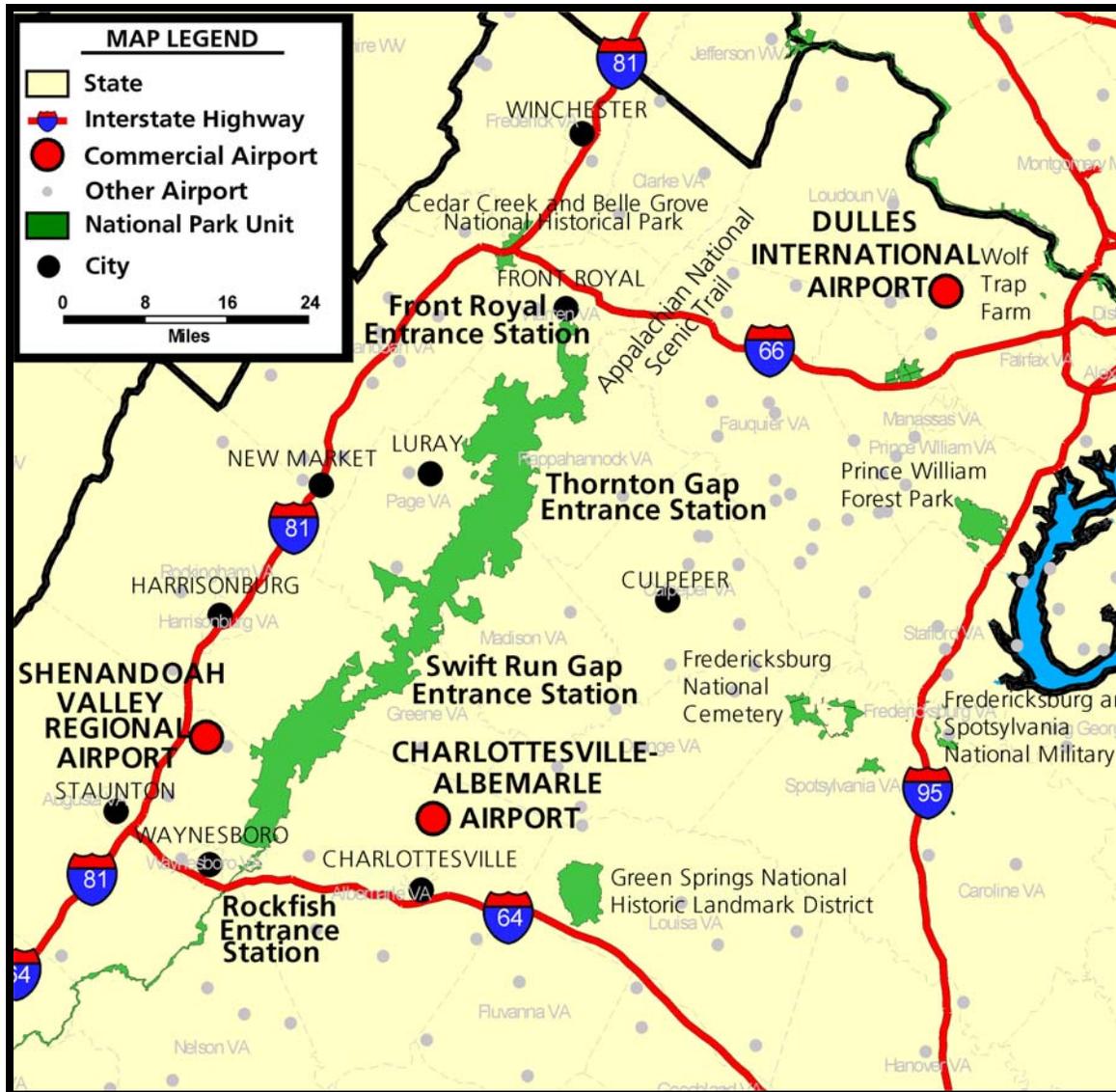
**Figure 5-6**  
**Transit Agencies in the Shenandoah Region**



## Air Travel Data

The closest commercial airports to Shenandoah National Park are Dulles International Airport in Chantilly, VA, Charlottesville-Albemarle Airport in Charlottesville, VA, and Shenandoah Valley Regional Airport in Weyers Cave, VA (see Figure 5-7).

**Figure 5-7**  
**Airports in the Shenandoah Region**

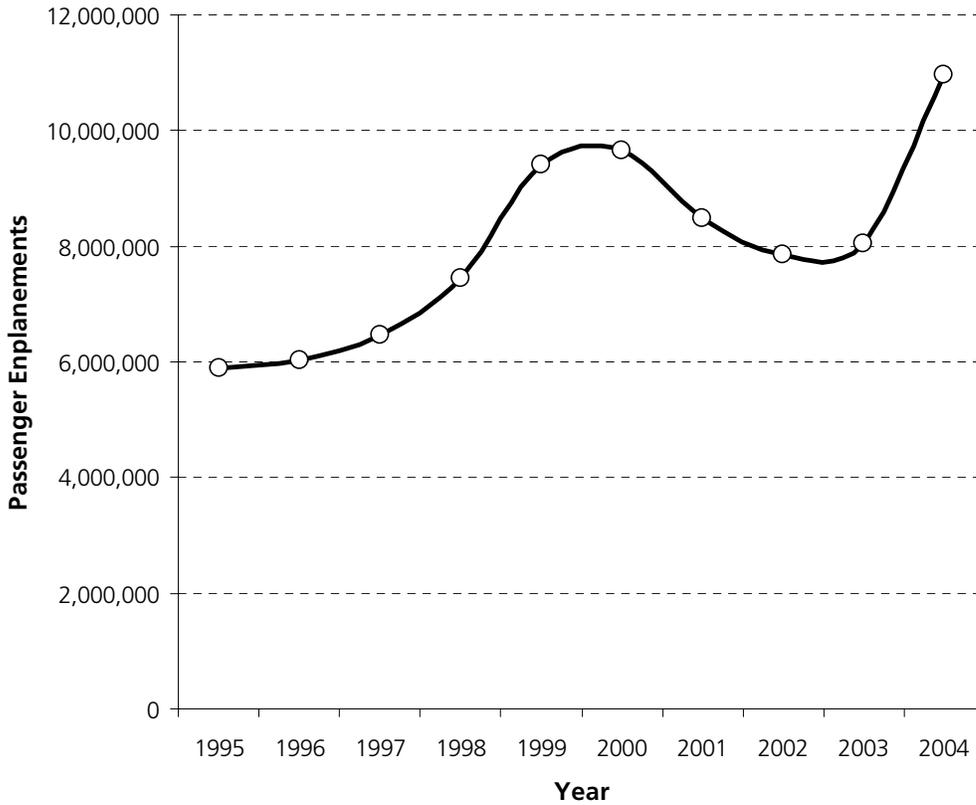


*Dulles International Airport*

Dulles International Airport is located approximately 60 miles east of the Thornton Gap Entrance Station, and approximately 55 miles east of the Front Royal Entrance Station. There are approximately 40 airlines that serve Dulles International Airport and provide non-stop service to approximately 85 domestic destinations and 40 international destinations. Fifteen major domestic airlines, 8 regional airlines and 20 international airlines serve Dulles International Airport. Figure 5-8 shows changes in the total annual number of passengers boarding flights at Dulles International Airport for the ten year period 1995 to 2004. Overall, passenger boardings have almost doubled during the period, from approximately 6 million in 1995 to approximately 11 million in 2004, with temporary declines experienced in 2001 and 2002 due primarily to the nationwide decline in air travel during that period.

**Figure 5-8**  
**Change in Passenger Boardings at Dulles International Airport (1995 to 2004)**

Source: Federal Aviation Administration, Air Carrier Activity Information System (ACAIS) data.  
URL < <http://www.faa.gov/arp/planning/stats/index.cfm?nav=cargo> >

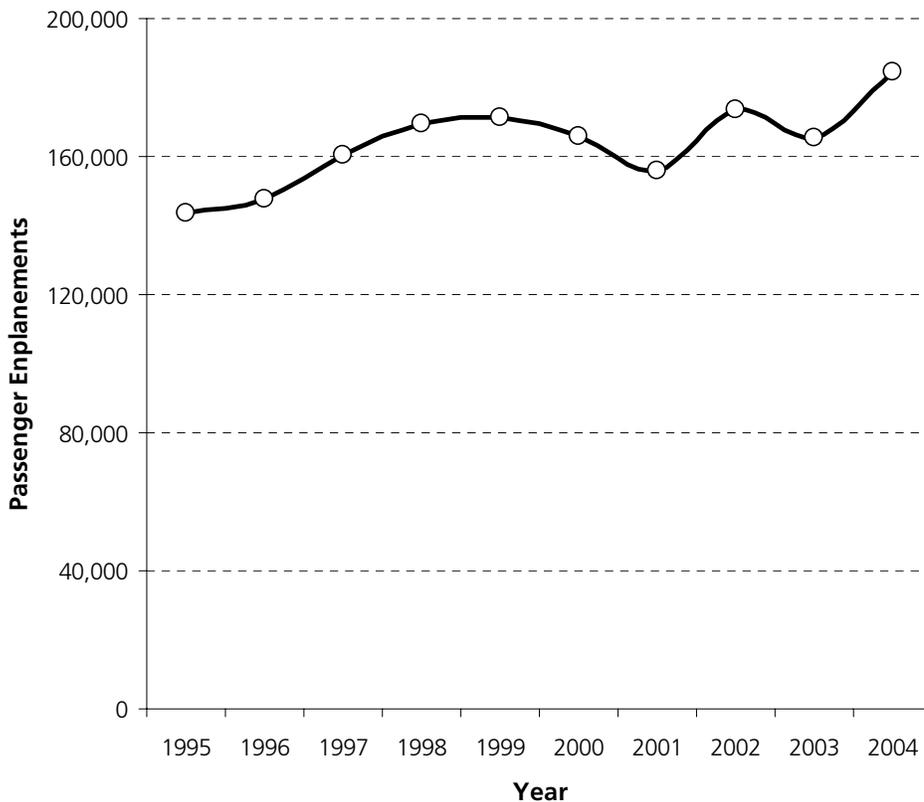


### Charlottesville-Albemarle Airport

Charlottesville-Albemarle Airport is located approximately 29 miles east of the Rockfish Entrance Station, and approximately 20 miles east of the Swift Run Gap Entrance Station. Approximately four major commercial airlines serve Charlottesville-Albemarle Airport, including Northwest Airlines (offering non-stop service to Detroit), Delta Connection (offering non-stop service to Cincinnati and Atlanta), United Express (offering non-stop service to Dulles International Airport), and US Airways Express (offering non-stop service to Philadelphia, Charlotte, and LaGuardia Airport in New York City). These four airlines operate a combined total of approximately 60 daily non-stop flights serving Charlottesville-Albemarle Airport. Figure 5-9 shows changes in the total annual number of passengers boarding flights at Charlottesville-Albemarle Airport for the ten year period 1995 to 2004. Overall, passenger boardings have increased by approximately 30% during the period, with temporary declines in passenger boardings experienced in 2000 and 2001 due in part to the nationwide decline in air travel during that period.

**Figure 5-9**  
**Change in Passenger Boardings at Charlottesville-Albemarle Airport (1995 to 2004)**

Source: Federal Aviation Administration, Air Carrier Activity Information System (ACAIS) data.  
URL < <http://www.faa.gov/arp/planning/stats/index.cfm?nav=cargo>>

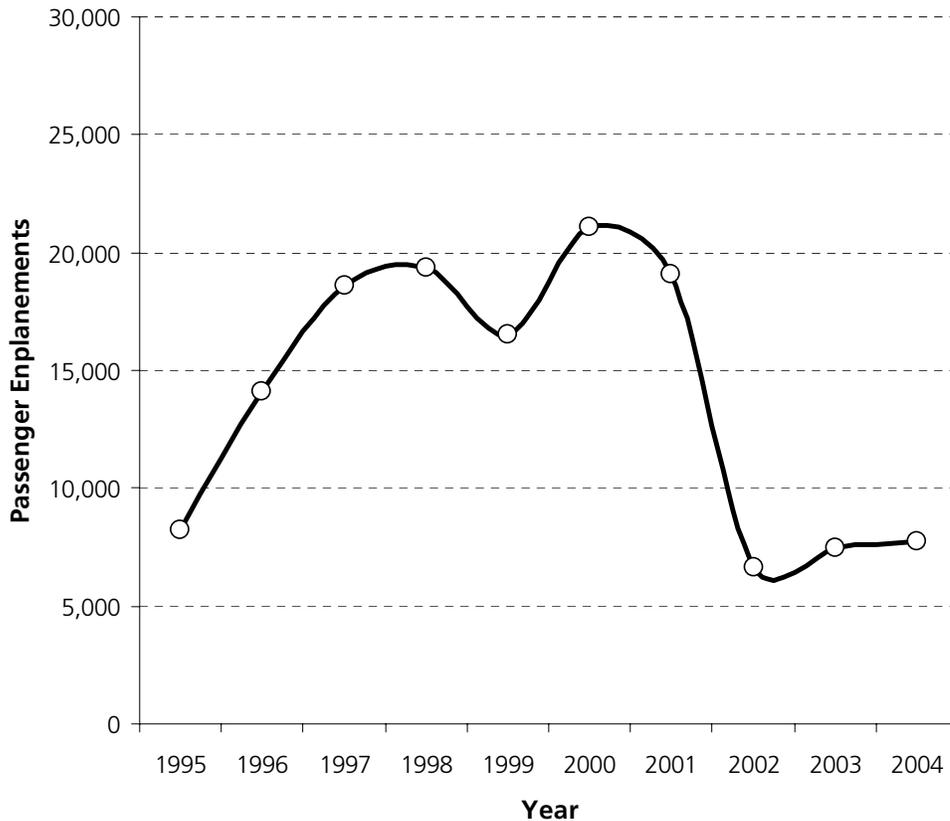


*Shenandoah Valley Regional Airport*

Shenandoah Valley Regional Airport is located approximately 24 miles west of the Swift Run Gap Entrance Station, and approximately 22 miles northwest of the Rockfish Entrance Station. One commercial airline, US Airways Express (Colgan Air), serves Shenandoah Valley Regional Airport and provides approximately three flights per day to Dulles International Airport. Figure 5-10 shows changes in the total annual number of passengers boarding flights at Shenandoah Valley Regional Airport for the ten year period 1995 to 2004. Overall, passenger boardings are currently about the same as they were ten years ago, though they had increased substantially in the late 1990's through 2001.

**Figure 5-10**  
**Change in Passenger Boardings at Shenandoah Valley Regional Airport (1995 to 2004)**

Source: Federal Aviation Administration, Air Carrier Activity Information System (ACAIS) data.  
URL < <http://www.faa.gov/arp/planning/stats/index.cfm?nav=cargo>>



## Other Transportation Services

Intercity bus service<sup>57</sup> is provided in the Shenandoah region by Greyhound (Carolina Trailways), which serves approximately 30 locations throughout Virginia, the closest of which to Shenandoah National Park is located in Charlottesville (see Figure 5-11). Motorcoach tour bus operators also serve Shenandoah National Park directly, with approximately 60% of all motorcoach activity to the park during the year occurring during the months of September and October in conjunction with the fall foliage season and peak visitation to the park. During these two months, the largest number of motorcoach bus tours are seen on weekends, however strong demand also occurs on weekdays during these two months. Motorcoaches pay a commercial tour fee to enter the park, which ranges from between \$75 per vehicle for 7 to 15 passenger buses, up to \$200 per vehicle for vehicles with a capacity of 26 or more passengers. A commercial tour is defined by the park as consisting of "one or more persons traveling on an itinerary that has been packaged, priced or sold for leisure or recreational purposes by an organization that realizes financial gain through the provision of the service."

**Figure 5-11**  
**Intercity Bus Routes in Virginia**

Source: Greyhound Lines, Inc. URL <<http://www.greyhound.com/locations/routemap.shtml>>



<sup>57</sup> Intercity bus service is also sometimes referred to as "over-the-road" (OTRB) bus service.

## Other Potential Data Sources

There are various other potential sources of transportation data that may be useful in future GMP planning efforts. As noted earlier in Chapter 2, Travel Shenandoah/511 Virginia is a regional traveler information service operated by Travel Shenandoah, a non-governmental organization sponsored by Virginia Tech and the Virginia Department of Transportation (VDOT). Travel Shenandoah/511 Virginia works with state and regional agencies and businesses to provide traveler information in the Shenandoah region. This service provides regional travelers with Internet-based real-time travel and traffic conditions, 511 telephone information service, trip mapping, attraction/event information, and food and lodging information.

Concession operations at Shenandoah National Park are provided by Aramark.<sup>58</sup> These operations include the provision of food, lodging and other services to park visitors. Visitor data for visitors who utilize lodging provided by Aramark and other related information may be available from Aramark.

Finally, further information characterizing park visitors could be obtained from development and implementing park visitor surveys in conjunction with the NPS Social Science Program that are specifically targeted to address transportation-related issues at the park.

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<sup>58</sup> Aramark Parks & Resorts. URL <<http://www.aramarkparks.com/>>

## Chapter 6: Socioeconomic Characteristics and Trends for the Shenandoah Region

*This section analyzes the socioeconomic characteristics of the Shenandoah region in order to identify regional characteristics and trends that may affect visitation to Shenandoah National Park and the subsequent demand for Alternative Transportation Systems (ATS). Trends in socioeconomic and demographic factors are analyzed, and these are then related to the available social science research and literature regarding the impacts of various factors on visitation to the national parks. From this, insights are drawn regarding the potential consequences for future visitation to Shenandoah National Park and potential demand for Alternative Transportation Systems (ATS).*

### Introduction

Socioeconomic trends and variables that are reviewed in this section include both demographic and economic variables. Specific demographic topics that are addressed include population, age, gender, race, educational attainment, marital status, and crime. Specific economic topics that are addressed include income, employment, residential infrastructure and development, retail gasoline prices, and the commercial and industrial characteristics of the region. The issue of air quality is also discussed with regards to its potential impact on the visitor experience at Shenandoah National Park. These topics combine to paint a picture of Shenandoah's socioeconomic landscape from which comparisons are made to the state of Virginia as a whole, and to the nation.

One approach to better understanding the effect of changes in various socioeconomic variables upon park visitation would be to develop a statistical model that relates variation in factors that are thought to be determinants of the level of park visitation (such as gasoline prices, income, etc.) to variation in visitation levels. In this way, forecast changes in the variables thought to impact park visitation could be used to forecast potential changes in park visitation and in subsequent demand for alternative transportation systems (ATS). A recent NPS study has noted, however, that such quantitative methods are not wholly feasible for long-run forecasts of visitation, and that factors that influence park visitation, and ATS demand, are likely too complex to create a formal mathematical model that is reliable.<sup>59</sup> According to the study, such methods are likely only useful for analyzing short-term (2 or 3 year) trends in park visitation. Furthermore, the potential development of such a quantitative model is beyond the scope and available resources of the current study of Shenandoah National Park. Therefore, the focus of this analysis is to present the data and interpret it in a manner that relies on observing general correlations and trends, as opposed to a more detailed statistical analysis.

This analysis is broken down into five main sections. The first section provides an overview of general park visitation statistics at the national and regional levels, as well as at Shenandoah National Park, and the available social science research and literature regarding the impacts of various factors on visitation to the national parks. The second section reviews demographic trends in the Shenandoah region and for the state and nation. The third section reviews the economic characteristics of the Shenandoah region, both in absolute terms and again in comparison to the state and the nation. The fourth section attempts to link park visitor demand to ATS demand, and the final section discusses possible directions for future research and study of park visitation.

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<sup>59</sup> Gramann, James H. *Visitation Forecasting and Predicting Use of NPS Parks and Visitor Centers: Focus Group Report*. U.S. Department of Interior. National Park Service. Social Science Program. August 2003. URL <[http://www.nature.nps.gov/socialscience/docs/NPS\\_Forecasting\\_Report.pdf](http://www.nature.nps.gov/socialscience/docs/NPS_Forecasting_Report.pdf)>.

## Understanding Park Visitation

Identifying and understanding the characteristics of both park visitors as well as park non-visitors (who may be potential future visitors) is important in attempting to understand the potential impacts of various socioeconomic factors on park visitation. This information, combined with the available social science research and literature regarding the impacts of various socioeconomic factors on visitation to the national parks, and observed and forecast regional socioeconomic trends, can then be used to help understand potential changes in park visitation as socioeconomic conditions change.

The national park system includes various types of areas such as national parks, historical and cultural sites, seashores, recreational areas, military parks and national monuments. In recent surveys of both park visitors and non-visitors, nationwide the two biggest reasons cited by respondents for visiting a national park are for sightseeing (40%), and for vacationing with family and friends (16%).<sup>60</sup> Park visitors in the northeast region cited similar rationales for visiting national parks.

A majority (62%) of national park visitors surveyed recalled paying an entrance fee or using an annual or lifetime pass when having visited a park recently. For northeast region parks, this figure was somewhat lower at 49%. Of those that recalled paying an entrance fee, both nationally and in the northeast region the overwhelming majority (approximately 80%) of those surveyed believed that the fee was fair.

About 46% of those surveyed said they hadn't visited a national park in the previous two years. Of those, 27% had never been to a national park. Nationally, about 15% of those surveyed had never been to a national park. For the northeast region, this figure was approximately the same. When people were asked why they had never visited a national park, overwhelmingly their answers were that: it is too far to travel (39%), or that they were too busy (34%). These two responses are related in part, since greater travel distance and time plays can play a significant part for some in the reduced amount of time spent on park recreation as opposed to work or other activities.<sup>61</sup>

Another apparent detractor to park visitation is the lack of advertised information about the park units. When a sample of the general public was asked, "In your opinion, what is the most important thing the NPS can do to encourage you to visit units within the National Park System," 41% responded that they thought more advertising was necessary, followed by 12% who believed lower fees, more parking, and free transportation was important. This finding was fairly consistent for both park visitors and non-visitors, and regardless of which park region they lived in.

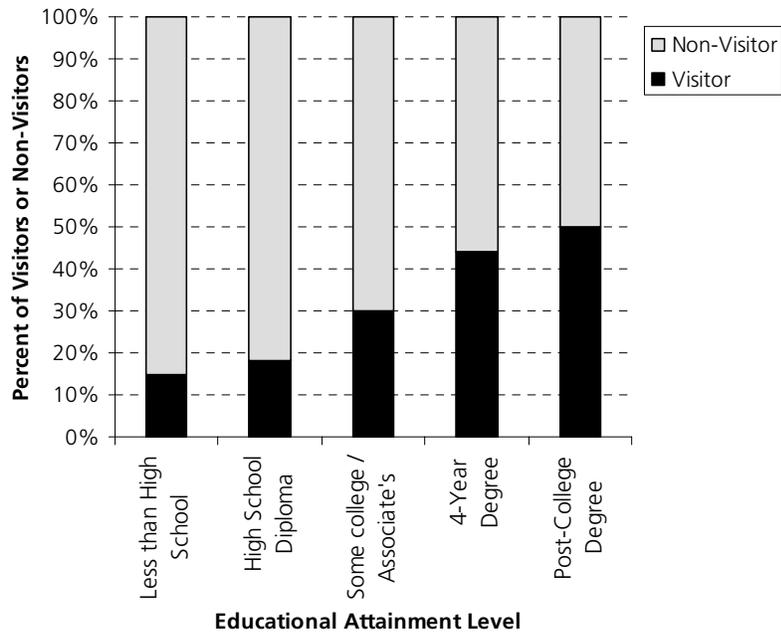
The survey also revealed some interesting correlations between certain national demographic variables and park visitation. For example, high educational attainment levels are positively correlated with a person being a recent or regular park visitor (see Figure 6-1). Married individuals, or people with life partners, are also more likely to be a regular park visitors compared to those who are single, divorced, or widowed (see Figure 6-2).

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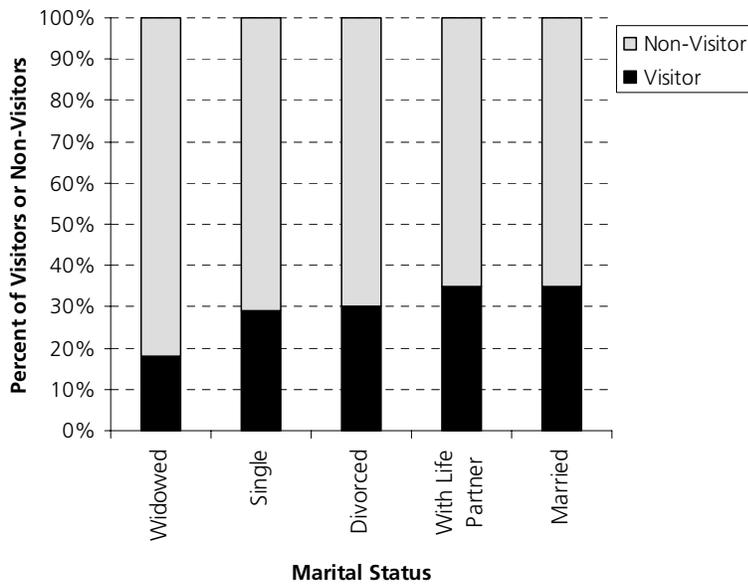
<sup>60</sup> U.S. Department of the Interior. National Park Service. NPS Social Science Program. *The National Park Service Comprehensive Survey of the American Public – Technical Report*. June 2001. URL <<http://www.nature.nps.gov/socialscience/docs/NatSurvTechRep.pdf>>.

<sup>61</sup> U.S. Department of the Interior. National Park Service. NPS Social Science Program. *The National Park Service Comprehensive Survey of the American Public – Technical Report*. June 2001. URL <<http://www.nature.nps.gov/socialscience/docs/NatSurvTechRep.pdf>>.

**Figure 6-1**  
**Educational Attainment Level and Park Visitation**



**Figure 6-2**  
**Marital Status and Park Visitation**



Interestingly, people with internet access were found to be more likely to be park visitors than those without easy access to the internet either at work or at home (see Figure 6-3). In terms of race, those who are white or Asian were found to visit parks more often relative to other races, and those who were black or African American were found to be the least likely to visit parks on a regular basis (see Figure 6-4). On a national basis, males are slightly more likely to visit a national park regularly compared to females (see Figure 6-5). Finally, park visitation increases with age up to a point near retirement, where it then begins to fall to levels more similar to that of a young adult (see Figure 6-6).

The NPS Social Science Program recently published a survey specifically studying park visitors and non-visitors of different races in order to assess what specific racial differences exist in terms of park visitation.<sup>62</sup> As one might expect, the three reasons most cited by non-visitors of all racial groups studied (whites, Hispanic Americans, and African Americans) for not visiting an NPS unit were: lack of information, high costs, and travel distance. There were a few differences among the races, however. For example, 76% of Hispanics said that hotel and food costs were too expensive compared to just 62% of whites that listed that factor as a concern. 63% of Hispanics also complained that reservations were needed too far in advance of visiting certain parks, compared to only 49% of African Americans and 51% of whites. Interestingly, approximately 25% of surveyed Hispanics cited security and safety concerns as reasons for not visiting a park, compared to just 9% of African Americans and 11% of whites. Meanwhile, 21% of African Americans suggested that park units are uncomfortable places to be, compared to just 7% of Hispanic Americans and 6% of whites.<sup>63</sup>

There were noted differences between the two minority groups as compared to whites. Both Hispanics and African Americans tended to cite concerns about entrance fees, service fees, poor service, distance traveled, and lack of information about parks.<sup>64</sup> This relative lack of satisfaction among minority non-visitors may at least somewhat explain why Hispanic Americans and African Americans, on a percentage basis, tend to visit parks less than their white counterparts.

In addition to demographic variables such as the ones discussed above, a variety of economic characteristics are also of interest with regards to park visitation. The most important economic characteristics that correlate with park visitation are income and employment. As one would expect, park visitation is positively correlated with household income (see Figure 6-7). Less than 20% of households that earned less than \$20,000 in 1999 were defined as regular visitors by the survey. In contrast, for those households earning \$100,000 or more this figure was approximately 50%. This trend holds true at both the national level and for the northeast park region.

The relationship between employment status and park visitation is not quite as clear (see Figure 6-8). For example, relative to other status groups, full and part-time workers, self-employed workers, and students are more likely to be regular park visitors. In contrast, the disabled, the unemployed, the retired, and homemakers / caregivers appear to be the least inclined to visit a national park. It therefore appears that, generally, people who are employed are more likely

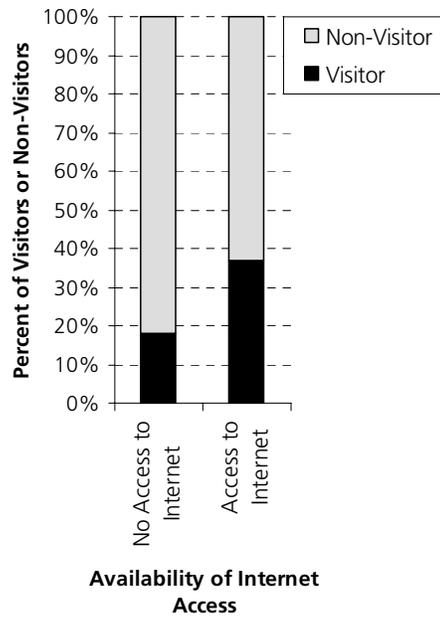
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<sup>62</sup> Solop, Frederic I., Kristi K. Hagen, and David Ostergren. *Comprehensive Survey of the American Public – Ethnic and Racial Diversity of the National Park System Visitors*. U.S. Department of the Interior. National Park Service. NPS Social Science Program. December 2003. URL <[http://www.nature.nps.gov/socialscience/docs/Ethnic\\_and\\_Racial\\_Diversity\\_Report\\_12\\_2003.pdf](http://www.nature.nps.gov/socialscience/docs/Ethnic_and_Racial_Diversity_Report_12_2003.pdf)>.

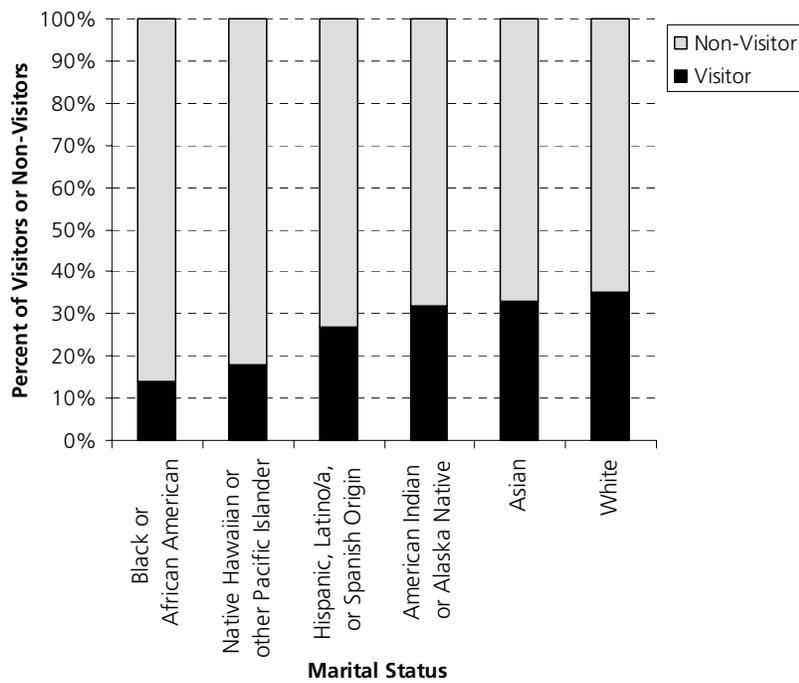
<sup>63</sup> Solop, Frederic I., Kristi K. Hagen, and David Ostergren. *Comprehensive Survey of the American Public – Ethnic and Racial Diversity of the National Park System Visitors*. U.S. Department of the Interior. National Park Service. NPS Social Science Program. December 2003. URL <[http://www.nature.nps.gov/socialscience/docs/Ethnic\\_and\\_Racial\\_Diversity\\_Report\\_12\\_2003.pdf](http://www.nature.nps.gov/socialscience/docs/Ethnic_and_Racial_Diversity_Report_12_2003.pdf)>.

<sup>64</sup> Solop, Frederic I., Kristi K. Hagen, and David Ostergren. *Comprehensive Survey of the American Public – Ethnic and Racial Diversity of the National Park System Visitors*. U.S. Department of the Interior. National Park Service. NPS Social Science Program. December 2003. URL <[http://www.nature.nps.gov/socialscience/docs/Ethnic\\_and\\_Racial\\_Diversity\\_Report\\_12\\_2003.pdf](http://www.nature.nps.gov/socialscience/docs/Ethnic_and_Racial_Diversity_Report_12_2003.pdf)>.

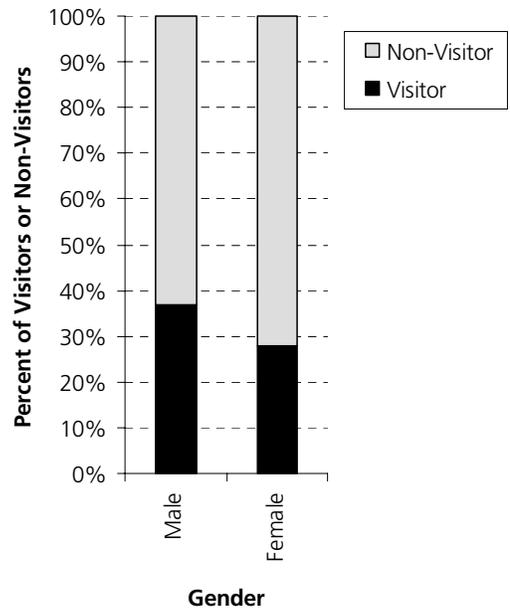
**Figure 6-3**  
**Internet Access and Park Visitation**



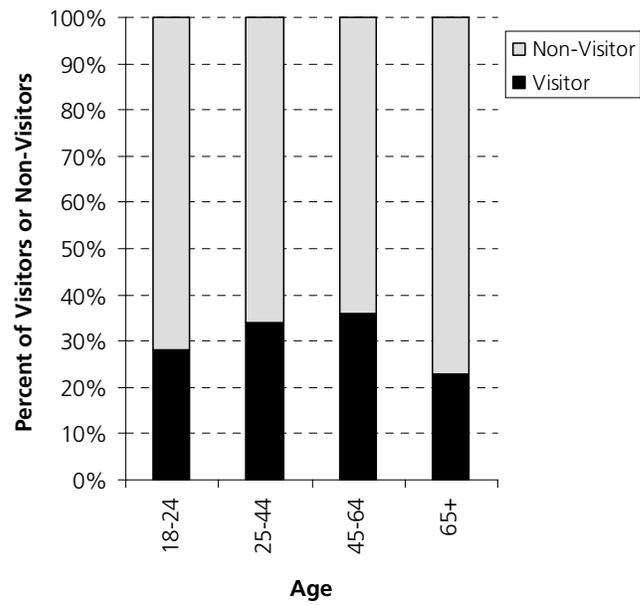
**Figure 6-4**  
**Race and Park Visitation**



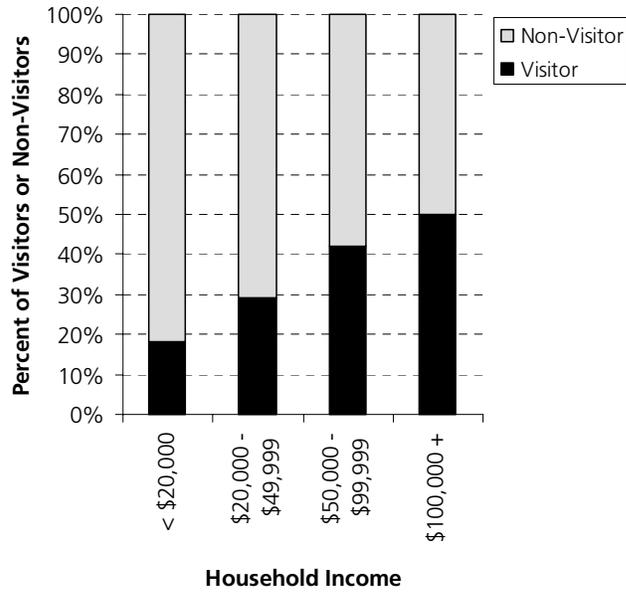
**Figure 6-5**  
**Gender and Park Visitation**



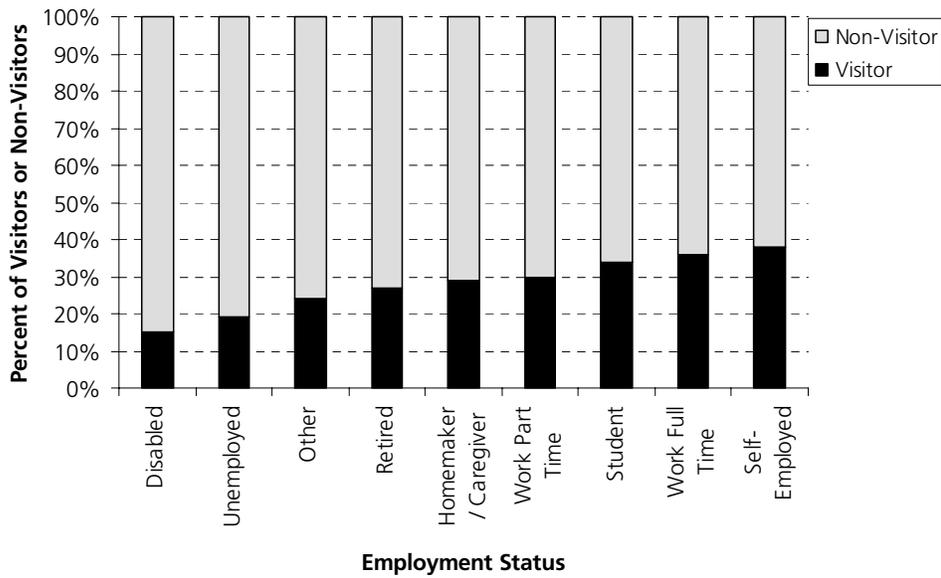
**Figure 6-6**  
**Age and Park Visitation**



**Figure 6-7**  
**Income and Park Visitation**



**Figure 6-8**  
**Employment Status and Park Visitation**



to be regular park visitors, while people who are not participating in the workforce for one reason or another are least likely to be park visitors. The only exception to this observations is for the group “students.” One possible reason why students may visit parks relatively more often than some other groups who are not employed is that school related field trips, even in college, are sometimes to national park sites.

It should be noted that some of the relationships that appear to exist between the socioeconomic variables presented above and park visitation may not be as clear as they seem. In some cases, there may be a mediating variable that blurs the apparent cause and effect relationship between the characteristics in question. For example, it was previously noted that those who are employed tend to visit parks more than those who are not employed. This may be true not solely because of their employment status, but instead it may be that those who are employed have more income and are thus better able to afford trips to national parks. Here, income acts as a mediating variable between employment status and park visitation. The same might be said for the relationship between educational attainment level and park visitation, where income may also act as a mediating variable since educational attainment level is often correlated with household income.

A further caution in interpreting the relationships that appear to exist between the socioeconomic variables presented above and park visitation is that the direction of causation is sometime not readily apparent. For example, it was previously noted that those with higher educational attainment levels tend to visit parks more. While it is likely the case that an individual’s educational attainment level motivates them to visit national parks more often, it may also be possible that those individuals who tend to visit national parks more and appreciate nature are perhaps more intrinsically motivated to advance their own knowledge by means of obtaining more education.

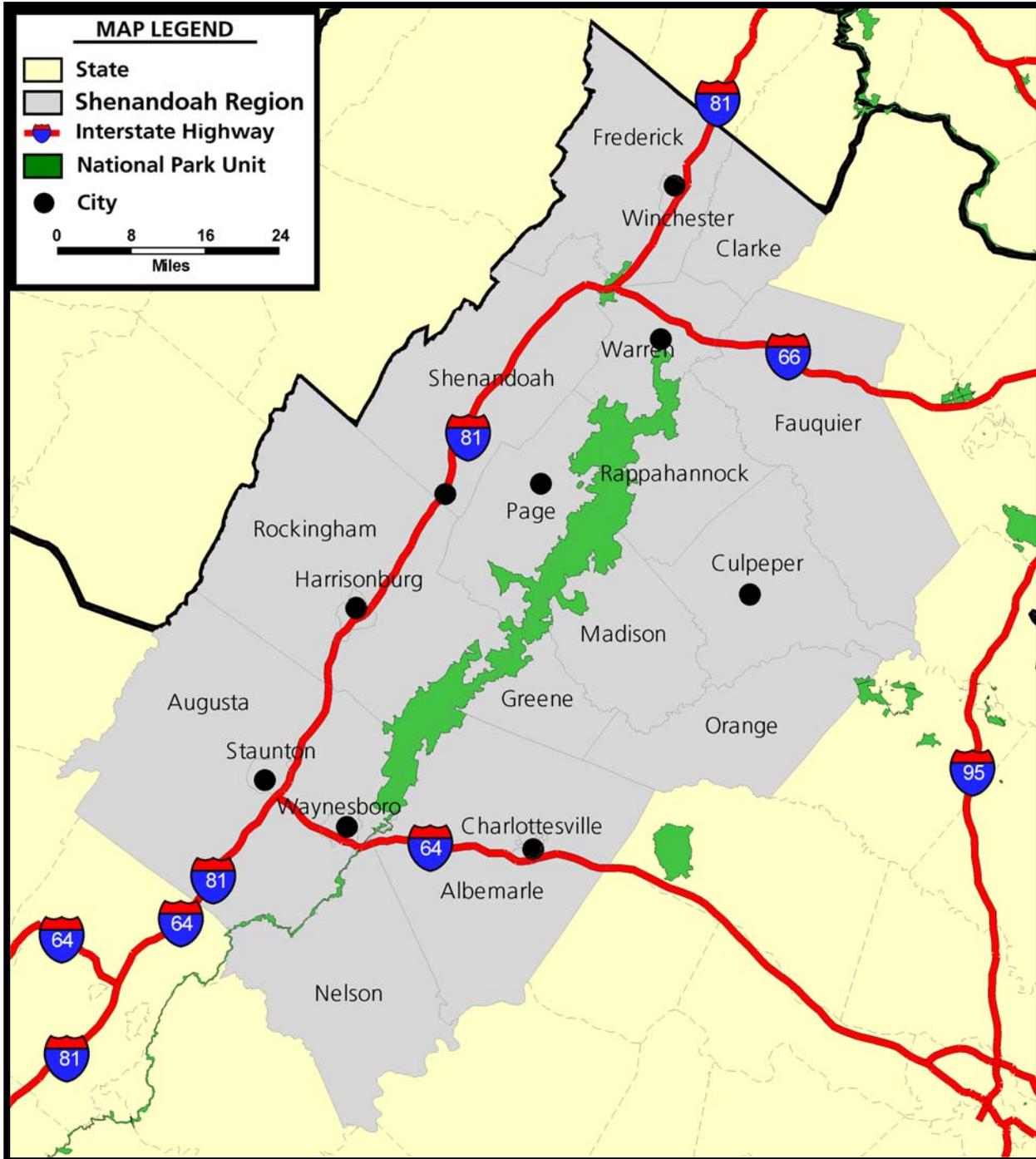
The discussion presented thus far regarding the characteristics of park visitors and non-visitors and the available social science research and literature regarding the impacts of various socioeconomic factors on visitation to the national parks has primarily addressed the issue at the national and the regional level. In order to assess how socioeconomic trends in the Shenandoah region may affect Shenandoah National Park visitation, it is necessary to review the socioeconomic characteristics of visitors and non-visitors to Shenandoah National Park and of the resident population in the region surround the park. For this study, a region consisting of 15 counties and 5 independent cities was used to define the Shenandoah region (see Figure 6-9). These counties include: Albemarle, Augusta, Charlottesville (city)<sup>65</sup>, Clarke, Culpeper, Fauquier, Frederick, Greene, Harrisonburg (city), Madison, Nelson, Orange, Page, Rappahannock, Rockingham, Shenandoah, Staunton (city), Warren, Waynesboro (city), and Winchester (city). A recent NPS survey found that 27% of 1,827 surveyed visitors to Shenandoah Park reside in Virginia,<sup>66</sup> making the socioeconomic characteristics and trends of this region, and the resultant possible effects on park visitation, of particularly importance.

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<sup>65</sup> State law considers all Virginia municipalities that are incorporated as a city to be independent from other counties, and therefore these cities are treated as an independent county for statistical purposes.

<sup>66</sup> Littlejohn, Margaret. *Shenandoah National Park Visitor Study*. U.S. Department of Interior. National Park Service. Visitor Services Project. April 2002. URL < [http://www.psu.uidaho.edu/files/vsp/reports/127SHEN\\_rept.pdf](http://www.psu.uidaho.edu/files/vsp/reports/127SHEN_rept.pdf)>. Page 17.

Figure 6-9  
Map of the Shenandoah Region



Historical trends in park visitation are presented below for Shenandoah Park, the seven NPS regions, for other national park units designated as national parks, and for the NPS system as a whole. Visitation levels to NPS units in certain NPS regions or to certain types of NPS units varies significantly. The percentage change in park visitation for the 25 year period from 1979 to 2003 for these different subsets of park units is as follows:

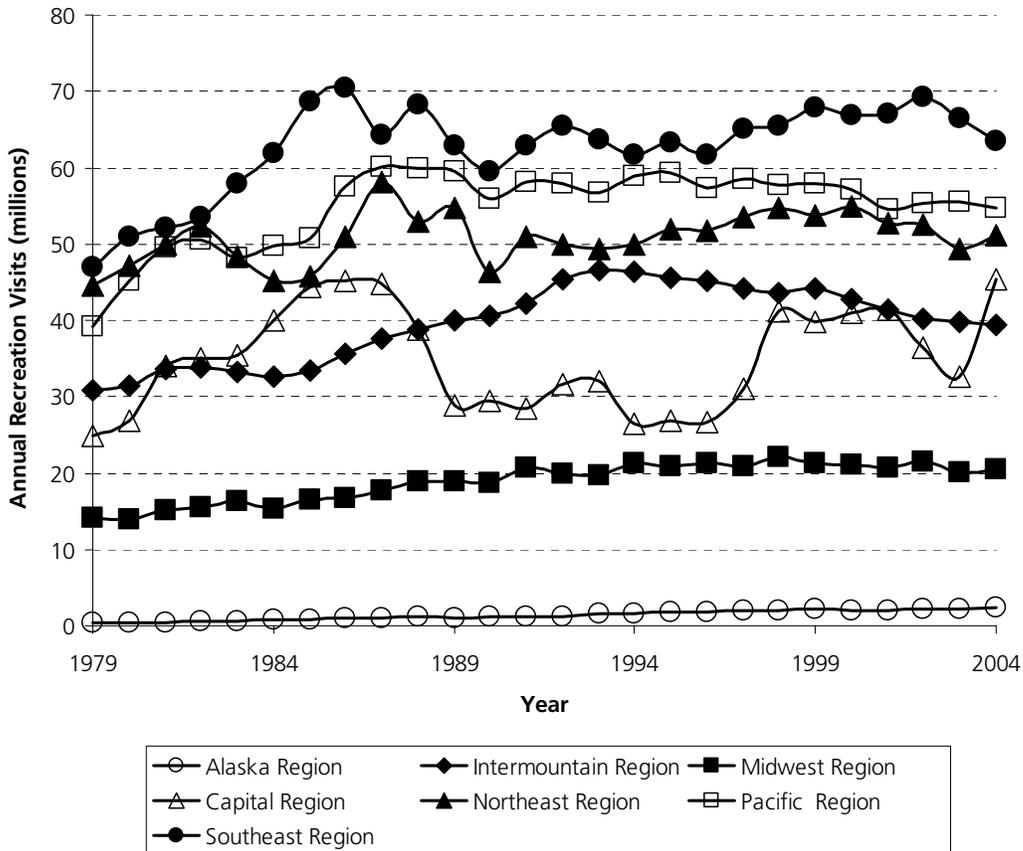
|  |             |
|--|-------------|
| <i>All NPS Units.....</i>                          | <i>47%</i>  |
| <i>All Units Designated as National Parks.....</i> | <i>46%</i>  |
| <i>By NPS Region</i>                               |             |
| <i>Alaska Region.....</i>                          | <i>309%</i> |
| <i>Intermountain Region.....</i>                   | <i>42%</i>  |
| <i>Midwest Region.....</i>                         | <i>21%</i>  |
| <i>Capital Region.....</i>                         | <i>152%</i> |
| <i>Northeast Region.....</i>                       | <i>1%</i>   |
| <i>Pacific Region.....</i>                         | <i>42%</i>  |
| <i>Southeast Region.....</i>                       | <i>45%</i>  |
| <i>Shenandoah National Park.....</i>               | <i>-28%</i> |

The national park system as a whole has experienced significant gains in visitation (an increase of 47%) over the past quarter century. Units designated as National Parks have experienced a near-identical trend in visitation, with an increase in visitation of 46% over the same time period. The Alaska Region and National Capital Regions have experienced the largest increases in visitation over the 25-year period, while the Northeast Region has experienced the least amount of growth in visitation with an overall increase of only 1% during the same time period. Figure 6-10 presents the historical trend in park visitation in each of the seven NPS regions over the 25-year period.

In contrast to the changes in visitation at the national and regional levels over the past 25 years, Shenandoah National Park has experienced reductions in visitation, most notably over the last several years. For example, for the period 1994 to 2004, recreation visits to Shenandoah National Park experienced an overall decline of 35%, falling from 1,926,883 in 1994 to 1,261,000 in 2004.

Overall, recreation visits to NPS units located in the state of Virginia fell by 10.5% during the same period. Of the fifteen NPS units located in the state of Virginia that were analyzed, only four experienced an increase in visitation during this period (Assateague Island National Seashore at 4.6%, Colonial National Historical Park at 1.0%, Maggie L. Walker National Historic Site at 6.3%, and Richmond National Battlefield Park at 2.5%). Northeast Region recreation visits also increased slightly during this period by 2.5% overall. Nationwide, all NPS units experienced a 3.1% increase in recreation visits overall during the same period. In summary, for the period 1994 to 2004, nationwide recreation visits to NPS units increased only modestly by 3.1% overall, with recreation visits to NPS units in the Northeast Region increasing even more modestly over the same period by only 2.5% overall. The sixteen NPS units located in the state of Virginia experienced an overall decline in visitation during the same period of -10.5%, with Shenandoah National Park experiencing a 34.6% decline during the period. Of the NPS units in the state of Virginia, this is the greatest decline in absolute terms (665,883 visitors) and the 3<sup>rd</sup> greatest decline in percentage terms.

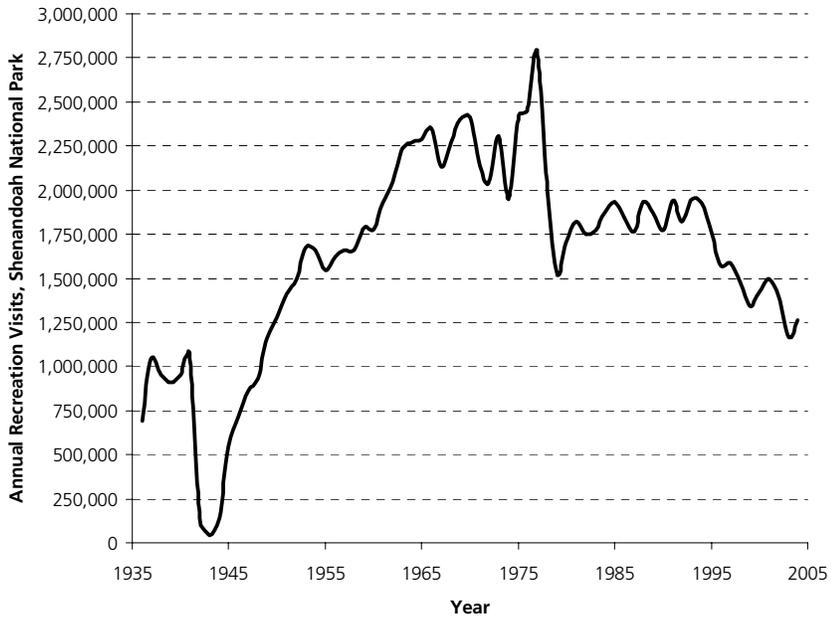
**Figure 6-10**  
**Historical NPS Visitation by Region**



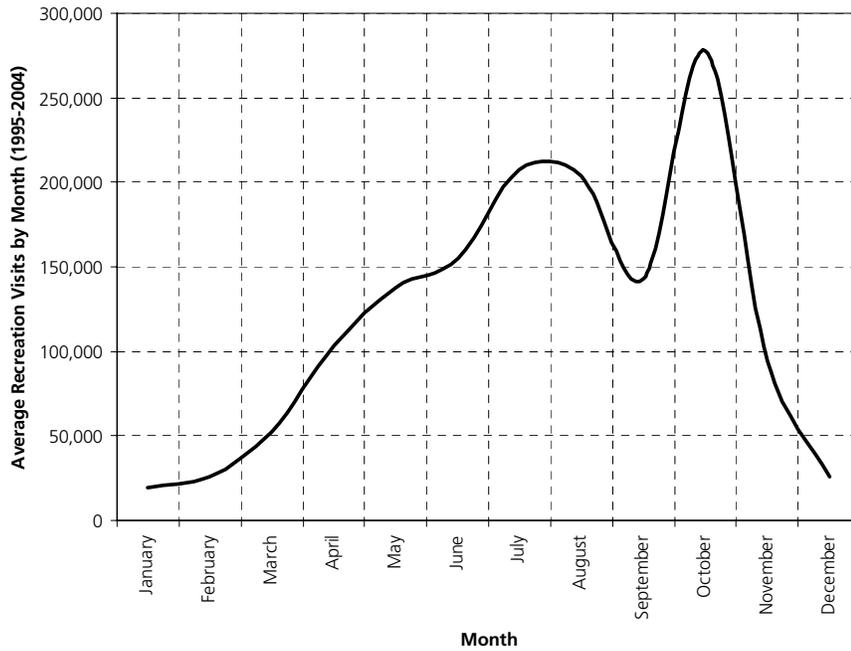
Historical recreational visitation data for Shenandoah National Park extends back to the time of its inception in 1936. Looking in more detail at visitation to Shenandoah National Park over the entire time from 1936 to the present, visitation was relatively low from the start, largely due to the effects of the Great Depression. Park visitation slipped further during WWII, reaching its lowest point in 1943, with only 43,831 annual visitors. Other decreases occurred in 1974 and 1979 due to two oil crises, which caused real gas prices to increase to record levels, dampening visitation related to Skyline Drive. Peak annual visitation was experienced in 1977, during the period between the two oil crises, with visitation reaching 2,789,100 that year. Visitation rebounded slightly after the oil crises of 1979, and experienced modest growth in the mid-1980's, only to decline again during the 1990's (see Figure 6-11). The events of September 11th are likely responsible in part for the more recent continuing decline in visitation experienced in 2002 and 2003.

Shenandoah National Park experiences significant seasonal fluctuations in visitation throughout the year. Average recreation visits by month for the ten-year period 1995-2004 is presented in Figure 6-12. The annual trend is for visitation to increase steadily from its annual average monthly low in January throughout the spring, reaching an initial mid-year peak in the month of July in the middle of summer, followed by a modest decline into August and then a substantial decline

**Figure 6-11**  
**Historical Visitation to Shenandoah National Park**



**Figure 6-12**  
**Seasonal Variation in Visitation to Shenandoah National Park**



into September as the school year begins and the summer vacation season ends. However, visitation then increases dramatically, almost doubling from September to October, reaching its annual peak during the month of October with visitation associated with fall foliage season.

### **Demographic Trends in the Shenandoah Region**

In order to examine the various demographic characteristics of interest, demographic data were obtained for the counties constituting the Shenandoah region of interest, for the state of Virginia, and for the nation as whole. The data from the twenty counties constituting the Shenandoah region were then aggregated to be representative of the Shenandoah region, and weighted by the county population where necessary in order to develop data accurately representing the demographic characteristics of the Shenandoah region.

#### *Population*

The total estimated resident population for the Shenandoah region for 2003 was 725,629, compared to a population of 7,386,330 in Virginia during this same time period.<sup>67</sup> The Shenandoah region, therefore, represents about 10% of Virginia's population. In fact, the population of the Shenandoah region has grown significantly faster than the population of either Virginia or the United States (see Table 6-1).<sup>68</sup> Interestingly, the birth rate in the Shenandoah region has been lower than the birth rate in either the state or the nation, while at the same time the death rate in the region has been relatively higher. While this difference has been converging in recent years, it is nevertheless interesting to note given the high rate of comparative population growth in the region.<sup>69</sup> The low birth rate and high death rate coupled with a relatively high population growth rate indicates that the Shenandoah region has experienced an increase in net-migration from other nearby regions, attracting residents from these other areas.

The number of households in the Shenandoah region as reported by the U.S. Census Bureau increased by 21% from 1990 to 2000 – faster than either the state (17.6%) or the nation (14.7%). Similarly, the number of families in the region as reported by the U.S. Census Bureau increased faster as well, from nearly 158,000 in 1990 to more than 180,000 in 2000. Given that approximately

The higher rates of growth in population, households, and families in the Shenandoah region relative to the rest of Virginia and the U.S., combined with the fact that approximately 27% of visitors to Shenandoah Park reside in Virginia,<sup>70</sup> suggests that these regional increases are likely to lead to an increase in park demand, all else equal, and to potential increases in the subsequent demand for ATS. It is possible, however, that any increased traffic congestion in the regional that may result from the increased regional population may dampen visitation to a degree as well.

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<sup>67</sup> Calculated from U.S. Department of Commerce, U.S. Census Bureau. *State and County Quickfacts*. URL <<http://quickfacts.census.gov>>.

<sup>68</sup> U.S. Department of Commerce, U.S. Census Bureau. *Decennial Census Data Sets*. URL <[http://factfinder.census.gov/servlet/DatasetMainPageServlet?\\_ds\\_name=DEC\\_1990\\_STF1\\_&\\_program=DEC&\\_lang=en](http://factfinder.census.gov/servlet/DatasetMainPageServlet?_ds_name=DEC_1990_STF1_&_program=DEC&_lang=en)>. U.S. Department of Commerce, U.S. Census Bureau. *State and County Quickfacts*. URL <<http://quickfacts.census.gov>>.

<sup>69</sup> University of Virginia Library. GeoStat Center. *County and City Databooks*. URL <<http://fisher.lib.virginia.edu/collections/stats/ccdb/>>. U.S. Department of Commerce, U.S. Census Bureau. *Decennial Census Data Sets*. URL <[http://factfinder.census.gov/servlet/DatasetMainPageServlet?\\_ds\\_name=DEC\\_1990\\_STF1\\_&\\_program=DEC&\\_lang=en](http://factfinder.census.gov/servlet/DatasetMainPageServlet?_ds_name=DEC_1990_STF1_&_program=DEC&_lang=en)>.

<sup>70</sup> Littlejohn, Margaret. *Shenandoah National Park Visitor Study*. U.S. Department of Interior. National Park Service. Visitor Services Project. April 2002. URL <[http://www.psu.uidaho.edu/files/vsp/reports/127SHEN\\_rept.pdf](http://www.psu.uidaho.edu/files/vsp/reports/127SHEN_rept.pdf)>. Page 17.

**Table 6-1  
Population Growth**

| County                   | Population Change  |                    |                           |                |               |
|--------------------------|--------------------|--------------------|---------------------------|----------------|---------------|
|                          | Population<br>1990 | Population<br>2000 | Population<br>2003 (est.) | 1990 -<br>2000 | 2000-<br>2003 |
| Albemarle                | 68,040             | 79,236             | 87,670                    | 16.2%          | 10.6%         |
| Augusta                  | 54,677             | 65,615             | 67,427                    | 20.3%          | 2.8%          |
| Charlottesville City     | 40,341             | 45,049             | 39,162                    | 11.3%          | -13.1%        |
| Clarke                   | 12,101             | 12,652             | 13,364                    | 4.6%           | 5.6%          |
| Culpeper                 | 27,791             | 34,262             | 38,555                    | 23.3%          | 12.5%         |
| Fauquier                 | 48,741             | 55,139             | 61,137                    | 13.2%          | 10.9%         |
| Frederick                | 45,723             | 59,209             | 64,565                    | 29.5%          | 9.0%          |
| Greene                   | 10,297             | 15,244             | 16,779                    | 48.0%          | 10.1%         |
| Harrisonburg City        | 30,707             | 40,468             | 41,170                    | 31.8%          | 1.7%          |
| Madison                  | 11,949             | 12,520             | 13,036                    | 4.8%           | 4.1%          |
| Nelson                   | 12,778             | 14,445             | 14,942                    | 13.0%          | 3.4%          |
| Orange                   | 21,421             | 25,881             | 28,018                    | 20.8%          | 8.3%          |
| Page                     | 21,690             | 23,177             | 23,589                    | 6.9%           | 1.8%          |
| Rappahannock             | 6,622              | 6,983              | 7,110                     | 5.5%           | 1.8%          |
| Rockingham               | 57,482             | 67,725             | 69,365                    | 17.8%          | 2.4%          |
| Shenandoah               | 31,636             | 35,075             | 37,199                    | 10.9%          | 6.1%          |
| Staunton City            | 24,461             | 23,853             | 23,848                    | -3.0%          | 0.0%          |
| Warren                   | 26,142             | 31,584             | 33,871                    | 20.8%          | 7.2%          |
| Waynesboro City          | 18,549             | 19,520             | 20,388                    | 5.2%           | 4.4%          |
| Winchester City          | 21,947             | 23,585             | 24,434                    | 7.5%           | 3.6%          |
| <b>Shenandoah Region</b> | <b>593,095</b>     | <b>691,222</b>     | <b>725,629</b>            | <b>16.5%</b>   | <b>5.0%</b>   |
| <b>State of Virginia</b> | <b>6,216,884</b>   | <b>7,078,515</b>   | <b>7,386,330</b>          | <b>14.4%</b>   | <b>4.3%</b>   |
| <b>U.S.</b>              | <b>249,622,814</b> | <b>281,421,906</b> | <b>290,809,777</b>        | <b>13.1%</b>   | <b>3.3%</b>   |

### Age

The distribution of the population by age group in the Shenandoah region is similar in most respects to that of Virginia and the United States. For all three areas, persons between the ages of 18 and 64 years make up between 58.0% and 60.3% of the population. However, the Shenandoah region does have a slightly higher proportion of the population in the age 65 and over group (see Table 6-2). The Shenandoah region has slightly lower percentage of population in the 5 to 17 years of age group (21.9%) as compared to the state (23.1%) and the nation (24.1%).

Though there are no substantial differences with regards to the distribution of the population by age group in the Shenandoah region as compared to the state and nation, as was noted earlier (see Figure 6-6), those 65 years and older tend to visit national parks less frequently than younger age groups. Thus, if the proportion of the population age 65 years and over continues to increase relative to other areas, it may have a somewhat negative effective on visitation at Shenandoah National Park.

According to data from the U.S. Census Bureau, the percentage of the Shenandoah region population in the age 65 and over group increased between 1990 and 2000, while all other age groups have experience a decline in their share of the overall population. Specifically, the percentage of the region's population in the age 65 and over group has increased by 4.2%, while

**Table 6-2  
Age Distribution**

| County                   | Age Group   |              |              |              |
|--------------------------|-------------|--------------|--------------|--------------|
|                          | < 5         | < 18         | 18-64        | 65+          |
| Albemarle                | 5.9%        | 23.3%        | 59.0%        | 11.8%        |
| Augusta                  | 5.4%        | 22.4%        | 60.1%        | 12.1%        |
| Charlottesville City     | 4.2%        | 14.6%        | 71.6%        | 9.7%         |
| Clarke                   | 4.9%        | 22.2%        | 58.9%        | 13.9%        |
| Culpeper                 | 6.0%        | 24.2%        | 58.6%        | 11.2%        |
| Fauquier                 | 6.0%        | 25.2%        | 58.9%        | 9.9%         |
| Frederick                | 6.1%        | 24.8%        | 59.2%        | 10.0%        |
| Greene                   | 7.0%        | 25.5%        | 58.5%        | 9.0%         |
| Harrisonburg City        | 4.5%        | 14.7%        | 71.9%        | 8.9%         |
| Madison                  | 5.5%        | 22.8%        | 57.6%        | 14.2%        |
| Nelson                   | 5.0%        | 20.6%        | 58.4%        | 16.0%        |
| Orange                   | 5.7%        | 21.7%        | 56.4%        | 16.2%        |
| Page                     | 5.2%        | 21.8%        | 58.1%        | 14.9%        |
| Rappahannock             | 4.9%        | 21.2%        | 60.8%        | 13.1%        |
| Rockingham               | 5.9%        | 23.1%        | 57.9%        | 13.1%        |
| Shenandoah               | 5.3%        | 21.1%        | 57.2%        | 16.4%        |
| Staunton City            | 4.9%        | 18.8%        | 59.1%        | 17.1%        |
| Warren                   | 6.2%        | 24.0%        | 58.3%        | 11.5%        |
| Waynesboro City          | 6.2%        | 22.4%        | 54.9%        | 16.5%        |
| Winchester City          | 5.7%        | 20.5%        | 60.1%        | 13.7%        |
| <b>Shenandoah Region</b> | <b>5.6%</b> | <b>21.9%</b> | <b>60.2%</b> | <b>12.3%</b> |
| <b>State of Virginia</b> | <b>6.1%</b> | <b>23.1%</b> | <b>60.3%</b> | <b>10.5%</b> |
| <b>U.S.</b>              | <b>6.4%</b> | <b>24.1%</b> | <b>58.0%</b> | <b>11.6%</b> |

the percentage of the population less than 5 years old has decreased by 12.63%. This trend is similar, though not as strong, for the state of Virginia. Nationally, while the percentage of children below the age of 5 has fallen, the percentage of those in the age 65 and over group has also declined, in contrast to the regional and state trends.<sup>71</sup> As the baby-boomer generation grows older in the coming decades, the increasing share of the population in the age 65 and over group seen in the Shenandoah region and the state of Virginia over the past decade is likely to continue to increase. As the proportion of the population age 65 and over continues to increase, it may have a somewhat negative effective on visitation at Shenandoah National Park given that those 65 years and older tend to visit national parks less frequently than younger age groups.

#### Gender

The proportion of the population that is male versus female in the Shenandoah region is very similar to that of both the state of Virginia and United States as a whole. In fact, the difference among the three areas is at its greatest only approximately .25%. In addition, these proportions have remained relatively constant over the past 15 years.<sup>72</sup> Due to this long term historical stability,

<sup>71</sup> U.S. Department of Commerce, U.S. Census Bureau. *Decennial Census Data Sets*. URL <[http://factfinder.census.gov/servlet/DatasetMainPageServlet?\\_ds\\_name=DEC\\_1990\\_STF1\\_&\\_program=DEC&\\_lang=en](http://factfinder.census.gov/servlet/DatasetMainPageServlet?_ds_name=DEC_1990_STF1_&_program=DEC&_lang=en)>.

<sup>72</sup> U.S. Department of Commerce, U.S. Census Bureau. *State and County Quickfacts*. URL <<http://quickfacts.census.gov>>. U.S. Department of Commerce, U.S. Census Bureau. *Decennial Census Data Sets*. URL <<http://factfinder.census.gov>>.

it is anticipated that changes in the population related to gender will not play a significant role in determining visitation to Shenandoah National Park in the future.

#### Race and Ethnicity

The racial composition of the Shenandoah region is significantly different from that of the state of Virginia and nation as a whole. There is about a 16% greater share of white individuals (among those reporting a single race) living in the Shenandoah than in the state of Virginia as a whole, and about 10% more than in the nation (see Table 6-3). This means there is a significantly smaller share of minority groups in the Shenandoah region compared to the state or nation. Only 8% of the population in the Shenandoah Region is black or African American, while almost 20% of Virginia's population and 12% of the national population is black or African American.<sup>73</sup> As shown earlier (Figure 6-4), a larger percentage of those who are white tend to be regular visitors to national parks, while a lesser percentage of the black or African American population tend to be regular visitors to national parks.

**Table 6-3**  
**Racial Composition**

| County                   | Race         |                           |                                    |                           |                   |
|--------------------------|--------------|---------------------------|------------------------------------|---------------------------|-------------------|
|                          | White        | Black or African American | American Indian or Native American | Asian or Pacific Islander | Other or Multiple |
| Albemarle                | 85.2%        | 9.7%                      | 0.2%                               | 2.9%                      | 2.2%              |
| Augusta                  | 95.0%        | 3.6%                      | 0.2%                               | 0.3%                      | 0.9%              |
| Charlottesville City     | 69.6%        | 22.2%                     | 0.1%                               | 4.9%                      | 3.1%              |
| Clarke                   | 91.1%        | 6.7%                      | 0.2%                               | 0.5%                      | 1.5%              |
| Culpeper                 | 78.3%        | 18.2%                     | 0.3%                               | 0.7%                      | 2.5%              |
| Fauquier                 | 88.4%        | 8.8%                      | 0.3%                               | 0.6%                      | 1.9%              |
| Frederick                | 95.0%        | 2.6%                      | 0.2%                               | 0.7%                      | 1.6%              |
| Greene                   | 91.0%        | 6.4%                      | 0.2%                               | 0.4%                      | 1.8%              |
| Harrisonburg City        | 84.8%        | 5.9%                      | 0.2%                               | 3.1%                      | 5.9%              |
| Madison                  | 86.7%        | 11.4%                     | 0.1%                               | 0.5%                      | 1.2%              |
| Nelson                   | 82.7%        | 14.9%                     | 0.2%                               | 0.3%                      | 1.9%              |
| Orange                   | 84.4%        | 13.8%                     | 0.2%                               | 0.3%                      | 1.3%              |
| Page                     | 96.3%        | 2.2%                      | 0.1%                               | 0.2%                      | 1.2%              |
| Rappahannock             | 92.6%        | 5.4%                      | 0.2%                               | 0.2%                      | 1.5%              |
| Rockingham               | 96.6%        | 1.4%                      | 0.1%                               | 0.3%                      | 1.6%              |
| Shenandoah               | 95.6%        | 1.2%                      | 0.2%                               | 0.3%                      | 2.7%              |
| Staunton City            | 83.3%        | 14.0%                     | 0.2%                               | 0.5%                      | 2.1%              |
| Warren                   | 92.7%        | 4.8%                      | 0.3%                               | 0.4%                      | 1.8%              |
| Waynesboro City          | 86.5%        | 10.0%                     | 0.3%                               | 0.6%                      | 2.7%              |
| Winchester City          | 82.1%        | 10.5%                     | 0.2%                               | 1.6%                      | 5.6%              |
| <b>Shenandoah Region</b> | <b>88.3%</b> | <b>8.0%</b>               | <b>0.2%</b>                        | <b>1.2%</b>               | <b>2.2%</b>       |
| <b>State of Virginia</b> | <b>72.3%</b> | <b>19.6%</b>              | <b>0.3%</b>                        | <b>3.8%</b>               | <b>4.0%</b>       |
| <b>U.S.</b>              | <b>75.1%</b> | <b>12.3%</b>              | <b>0.9%</b>                        | <b>3.7%</b>               | <b>7.9%</b>       |

servlet/DatasetMainPageServlet?\_ds\_name=DEC\_1990\_STF1\_&\_program=DEC&\_lang=en>.

<sup>73</sup> U.S. Department of Commerce, U.S. Census Bureau. *State and County Quickfacts*. URL <<http://quickfacts.census.gov>>.

Nevertheless, the trend from 1990 to 2000 indicates that the minority population in the Shenandoah region is growing at a faster rate relative to both the state and the nation. The share of the region's population classified as "American Indian or Native" and "Other," for example, has grown at more than twice the rate of that for either the state or the nation. The percentage of the population in the Shenandoah region that is classified as being of Hispanic origin, regardless of race, is also growing at faster rate than both the state or nation. That share of the total population has grown by nearly 194%, compared to only 81% and 39% for the state and the nation, respectively. However, the share of the population in the Shenandoah region that is black or African American fell by more than 4% between 1990 and 2002. This trend is contradictory to the state and nation, which both saw an increasing share of the population classified as black or African American.

Overall, between 1990 and 2000 the Shenandoah region, the state of Virginia, and the U.S. all experienced an increase in the percentage of their population consisting of racial minorities, with corresponding decreases in the share of the population consisting of whites. However, the proportion of the population in the Shenandoah region that is white declined by approximately 2% as compared with an approximate 6.5% reduction experienced in both the state of Virginia and the nation as whole.<sup>74</sup> While the relatively smaller minority population in the Shenandoah region increased as a percentage of the total population, the proportion of the population classified as black or African American declined relative to the state and the nation, such that the share of the region's population that is white has remained relatively high. Thus, while the increasing share of the population consisting of racial or ethnic minority groups in the Shenandoah region indicates the potential for some reduction in park visitation, this reduction is likely to be modest particularly when compared to other national parks in the state of Virginia and in the U.S.

#### *Crime*

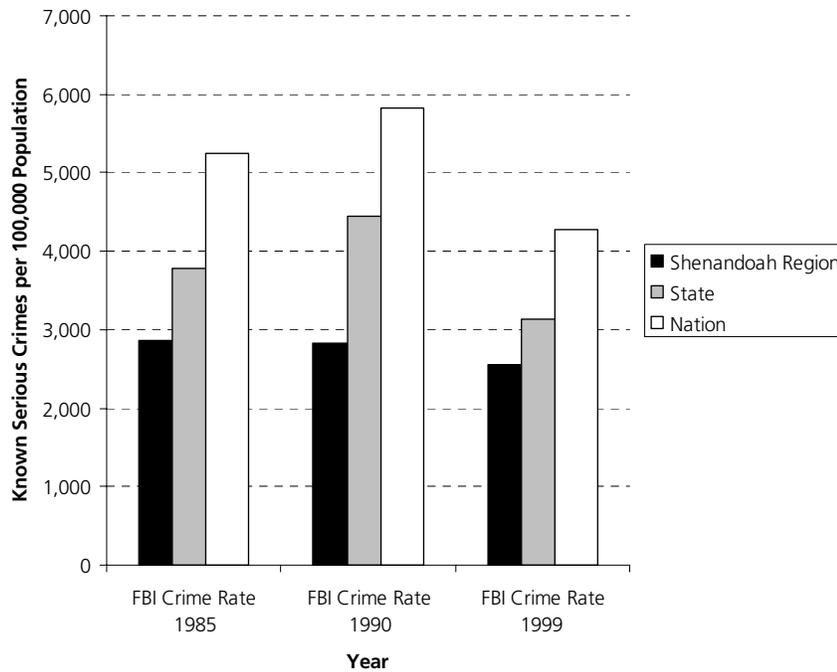
The Federal Bureau of Investigation (FBI) maintains crime rate statistics. Crime rate data were collected for the year 1985, 1990, and 1999. The crime rate in any given year is a measure of the annual number of known serious crimes committed in an area per 100,000 resident population. From 1985 to 1999, the FBI crime rate decreased for the Shenandoah region, the state of Virginia, and the nation.<sup>75</sup> Interestingly, the crime rate in the Shenandoah region has been consistently well below the state and national average for the three years analyzed (see Figure 6-13). Even when the state and national rates increased somewhat in the early 1990's, the Shenandoah rate actual fell slightly. To the extent that relatively higher crime rates in the areas surrounding a national park may have a slightly negative impact on park visitation, the significantly lower crime rate in the Shenandoah region relative to other areas may have a slightly positive effective on park visitation at Shenandoah National Park.

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<sup>74</sup> U.S. Department of Commerce, U.S. Census Bureau. State and County Quickfacts. URL <<http://quickfacts.census.gov>>. U.S. Department of Commerce, U.S. Census Bureau. *Decennial Census Data Sets*. URL <[http://factfinder.census.gov/servlet/DatasetMainPageServlet?\\_ds\\_name=DEC\\_1990\\_STF1\\_&\\_program=DEC&\\_lang=en](http://factfinder.census.gov/servlet/DatasetMainPageServlet?_ds_name=DEC_1990_STF1_&_program=DEC&_lang=en)>.

<sup>75</sup> U.S. Department of Commerce, U.S. Census Bureau. *FBI U.S. Crime Statistics (1977-1995)*. URL <<http://www.census.gov/statab/USA98/dd-cr.txt>>. U.S. Federal Bureau of Investigation. *Crime in the United States (1999): Section 2 - Crime Index Offenses Reported*. URL <[http://www.fbi.gov/ucr/Cius\\_99/99crime/99c2\\_01.pdf](http://www.fbi.gov/ucr/Cius_99/99crime/99c2_01.pdf)>.

**Figure 6-13**  
**Crime Rates**



#### *Educational Attainment*

Based on the available data, overall the population in the Shenandoah region does not have as high an educational attainment level, on average, as the population in the state of Virginia as a whole or the nation (see Table 6-4). As noted earlier (see Figure 6-1), individuals with lower levels of educational attainment tend to visit national parks less frequently, compared to those with higher levels of educational attainment. This would indicate that education attainment levels in the region might have a slightly negative effect on visitation levels to the park. However, educational attainment levels in the Shenandoah region, although lower, have increased at a greater rate than either the state or the nation. For example, the share of the region's population who have earned their high school diplomas increased by almost 22% from 1990 to 2000, compared to increases of 20.4% and 20.2% for the state and the nation, respectively. Therefore, whatever negative effect education attainment levels in the region may be having on park visitation is likely to become weaker over time if this trend continues.

#### *Marital Status*

As of 2000, the typical marital status of a Shenandoah region resident was essentially the same as that for the state of Virginia and the nation.<sup>76</sup> In all three areas, approximately one quarter of persons aged 15 or older have never been married. More than half of all individuals in the Shenandoah region are married and living with their spouse. Divorcees, widowers, and separated

<sup>76</sup> U.S. Department of Commerce, U.S. Census Bureau. *Decennial Census Data Sets*. URL <[http://factfinder.census.gov/servlet/DatasetMainPageServlet?\\_ds\\_name=DEC\\_1990\\_STF1\\_&\\_program=DEC&\\_lang=en](http://factfinder.census.gov/servlet/DatasetMainPageServlet?_ds_name=DEC_1990_STF1_&_program=DEC&_lang=en)>.

**Table 6-4**  
**Educational Attainment**

| County                   | Educational Attainment Level |                   |
|--------------------------|------------------------------|-------------------|
|                          | High School Degree           | Bachelor's Degree |
| Albemarle                | 87.4%                        | 47.7%             |
| Augusta                  | 78.2%                        | 15.4%             |
| Charlottesville City     | 80.8%                        | 40.8%             |
| Clarke                   | 82.1%                        | 23.9%             |
| Culpeper                 | 73.7%                        | 15.7%             |
| Fauquier                 | 84.5%                        | 27.1%             |
| Frederick                | 78.6%                        | 18.6%             |
| Greene                   | 78.4%                        | 19.8%             |
| Harrisonburg City        | 76.8%                        | 31.2%             |
| Madison                  | 75.0%                        | 19.4%             |
| Nelson                   | 69.0%                        | 20.8%             |
| Orange                   | 75.2%                        | 18.5%             |
| Page                     | 64.8%                        | 9.8%              |
| Rappahannock             | 76.0%                        | 22.9%             |
| Rockingham               | 72.4%                        | 17.6%             |
| Shenandoah               | 75.3%                        | 14.7%             |
| Staunton City            | 75.6%                        | 20.4%             |
| Warren                   | 75.5%                        | 15.0%             |
| Waynesboro City          | 77.9%                        | 20.6%             |
| Winchester City          | 75.4%                        | 23.7%             |
| <b>Shenandoah Region</b> | <b>77.9%</b>                 | <b>24.1%</b>      |
| <b>State of Virginia</b> | <b>81.5%</b>                 | <b>29.5%</b>      |
| <b>U.S.</b>              | <b>80.4%</b>                 | <b>24.4%</b>      |

couples make up the other quarter. Since these characteristics are essentially the same across all three areas, one would not expect much of a difference between the potential influence of marital status on park visitation at Shenandoah National Park versus other national parks, on average.

Between 1990 and 2000, the number of married couples who are living together increased by about 13% in the Shenandoah region. However, during the same period, the number of divorced persons in the region increased by 53%, compared with increases of 41% in the state of Virginia and 33% in the U.S. overall. Thus, while in 2000 marital status does not vary significantly among the three areas, it appears that the Shenandoah region has experienced a significant increase in the number of persons who are divorced, relative to both the state and the nation, since the early 1990's. Since, as shown earlier in Figure 6-2, persons who are divorced are somewhat less likely to be regular national park visitors relative to those who are married or living with a partner, if this trend continues it may have a somewhat negative impact on park visitation at Shenandoah National Park.

### *Airborne Pollutants*

The Environmental Protection Agency (EPA) compiles and maintains data regarding pollution levels of six common airborne pollutants (also referred to as “criteria pollutants”) for each county in the U.S. These six airborne pollutants include ozone, carbon monoxide, nitrogen dioxide, sulfur dioxide, particulate matter, and lead. Historically, of the 20 counties that compose the Shenandoah region for the purposes of this study, only three have ever been designated as being in non-attainment status with regards to any of these criteria pollutants between 1992 and the present: Frederick County, Madison County, and Page County.<sup>77</sup> According EPA definitions, a “non-attainment area” is one that “does not meet the national primary or secondary ambient air quality standard for the pollutant [type].”<sup>78</sup> In 2004, all three counties failed to meet the 8-hour Ozone standards set forth by the EPA, though these were only “basic” (non-severe) violations of the standard. The 8-hour ozone measure is a stricter measure (as compared to the 1-hour ozone standard) of ozone levels in the air of a given area. Given that only a handful of counties have violated EPA standards in the past, and given that the severity and frequency of non-attainment in these counties were low, one could conclude that the Shenandoah region is a relatively air pollution-free zone.

Despite the region having a record of relatively low airborne pollution, Shenandoah National Park still experiences air quality problems that affect visibility within the park. Haze is a primary cause of visibility impairment in many national parks. Haze results when sunlight encounters tiny pollution particles in the air. Light is both absorbed by these particles as well as scattered before it reaches an observer. More airborne pollutants result in more absorption and scattering of light, and more visual impairment. Some types of particles such as sulfates scatter more light, particularly during humid conditions, and result in a larger reduction in visibility.

EPA and other federal agencies have been monitoring visibility in the national parks and other federal lands since 1988. In 1999, EPA announced a major effort to improve air quality in the national parks and other federal lands. The resulting *Regional Haze Rule* calls for state and federal agencies to work together to improve visibility in 156 national parks and wilderness areas throughout the U.S., including at Shenandoah National Park. Figure 6-14 shows a comparison of visibility conditions at Shenandoah National Park under both clear and hazy conditions. According to the National Parks Conservation Association (NPCA), sulfite particles emitted from nearby power plants, in combination with the natural photosynthesis that takes place in the Blue Ridge Mountains, has made Shenandoah National Park the third worst park in the U.S. in terms of visual range.<sup>79</sup> Given that a significant element of the visitor experience at Shenandoah National Park is the view afforded to visitors while on Skyline Drive, this has potentially played a roll in Shenandoah’s decline in visitation in recent years. In general, continuing or increasing pollution levels in the region of the park that lead to reduced visibility are likely to lead to further declines in park visitation.

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<sup>77</sup> U.S. Environmental Protection Agency. *Green Book. Nonattainment Areas for Criteria Pollutants. Non-attainment Status for Each County by Year*. URL <<http://www.epa.gov/oar/oaqps/greenbk/anay.html>>.

<sup>78</sup> U.S. Environmental Protection Agency. *Green Book. Nonattainment Areas for Criteria Pollutants. Definitions*. URL <<http://www.epa.gov/oar/oaqps/greenbk/define.html>>.

<sup>79</sup> National Parks Conservation Association. *Shenandoah Park: State of the Parks Assessment*. URL <[http://www.npca.org/across\\_the\\_nation/park\\_pulse/shenandoah/shenandoah.pdf](http://www.npca.org/across_the_nation/park_pulse/shenandoah/shenandoah.pdf)>.

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**Figure 6-14**  
**Airborne Pollutants and Visibility**



Source: U.S. Environmental Protection Agency.  
URL <<http://www.epa.gov/air/visibility/parks/shenan.html>>

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### **Economic Trends in the Shenandoah Region**

#### *Recent Business Patterns*

The total number of business establishments in all industries for 2002 for each of the three areas being analyzed is as follows:<sup>80</sup>

|                          |           |
|--------------------------|-----------|
| Shenandoah region: ..... | 19,091    |
| State of Virginia: ..... | 180,501   |
| U.S. Total: .....        | 7,200,770 |

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<sup>80</sup> U.S. Department of Commerce, U.S. Census Bureau. *County Business Patterns*. URL <<http://www.census.gov/epcd/cbp/view/cbpview.html>>.

As is true for the state and the nation (see Table 6-5), the construction and retail trade industries together make up the largest portion of all the establishments in the Shenandoah region at approximately 32% of the total (see Table 6-6).

Since 1998, the economic landscape in the Shenandoah region has evolved to the point where a larger percentage of the regional economy consists of business establishments in service industries such as information services, finance and insurance, real estate, professional / scientific / technical services, and educational services. Industries like mining, utilities, manufacturing and management have decline in importance in terms of the relative number of establishments in the region in recent years. A similar trend can be seen at the state and national levels, with few exceptions. Interestingly, while the number of fishing, hunting and agriculture establishments relative to all establishments has dropped in recent years in both the state and nation, the Shenandoah region has gained in this area. The opposite is true for the utilities, and arts / entertainment / recreation industries (see Table 6-7).

**Table 6-5  
Number of Business Establishments (2002)**

| Industry                                | Number of Establishments |                |                  |
|---|--------------------------|----------------|------------------|
|   | Shenandoah Region        | Virginia       | U.S.             |
| 11-Forestry-Fishing-Hunting-Agriculture | 118                      | 760            | 26,552           |
| 21-Mining                               | 32                       | 365            | 23,871           |
| 22-Utilities                            | 38                       | 340            | 18,432           |
| 23-Construction                         | 2,869                    | 20,942         | 710,325          |
| 31-Manufacturing                        | 745                      | 5,773          | 344,341          |
| 42-Wholesale Trade                      | 706                      | 7,636          | 436,900          |
| 44-Retail Trade                         | 3,323                    | 29,194         | 1,125,693        |
| 48-Transportation-Warehousing           | 569                      | 4,884          | 195,143          |
| 51-Information                          | 375                      | 3,799          | 138,590          |
| 52-Finance-Insurance                    | 1,069                    | 10,665         | 450,422          |
| 53-Real Estate-Rental-Leasing           | 784                      | 7,659          | 323,024          |
| 54-Professional-Scientific-Technical    | 1,766                    | 23,164         | 772,365          |
| 55-Management                           | 82                       | 1,138          | 40,383           |
| 56-Admin-Support-Waste-Remediation      | 858                      | 9,122          | 343,544          |
| 61-Educational Services                 | 243                      | 2,029          | 73,701           |
| 62-Health-Social Assistance             | 1,527                    | 15,476         | 703,540          |
| 71-Arts-Entertainment-Recreation        | 305                      | 2,434          | 110,375          |
| 72-Accommodation-Food Services          | 1,386                    | 13,310         | 565,149          |
| 81-Other Services                       | 2,211                    | 20,761         | 740,118          |
| 95-Auxiliaries                          | 25                       | 314            | 13,580           |
| <b>TOTALS</b>                           | <b>19,031</b>            | <b>179,765</b> | <b>7,165,048</b> |

**Table 6-6**  
**Distribution of Business Establishments by Industry**

| Industry                                | Number of Establishments | Percent of Total |
|---|--------------------------|------------------|
| 44-Retail Trade                         | 3,323                    | 17.5%            |
| 23-Construction                         | 2,869                    | 15.1%            |
| 81-Other Services                       | 2,211                    | 11.6%            |
| 54-Professional-Scientific-Technical    | 1,766                    | 9.3%             |
| 62-Health-Social Assistance             | 1,527                    | 8.0%             |
| 72-Accommodation-Food Services          | 1,386                    | 7.3%             |
| 52-Finance-Insurance                    | 1,069                    | 5.6%             |
| 56-Admin-Support-Waste-Remediation      | 858                      | 4.5%             |
| All Other (detail below)                | 4,022                    | 21.1%            |
| 53-Real Estate-Rental-Leasing           | 784                      | 4.1%             |
| 31-Manufacturing                        | 745                      | 3.9%             |
| 42-Wholesale Trade                      | 706                      | 3.7%             |
| 48-Transportation-Warehousing           | 569                      | 3.0%             |
| 51-Information                          | 375                      | 2.0%             |
| 71-Arts-Entertainment-Recreation        | 305                      | 1.6%             |
| 61-Educational Services                 | 243                      | 1.3%             |
| 11-Forestry-Fishing-Hunting-Agriculture | 118                      | 0.6%             |
| 55-Management                           | 82                       | 0.4%             |
| 22-Utilities                            | 38                       | 0.2%             |
| 21-Mining                               | 32                       | 0.2%             |
| 95-Auxiliaries                          | 25                       | 0.1%             |
| <b>GRAND TOTAL</b>                      | <b>19,031</b>            | <b>100.0%</b>    |

**Table 6-7**  
**Change in the Number of Business Establishments (1998-2002)**

| Industry                                | Percent Change (1998 to 2002) |             |             |
|---|-------------------------------|-------------|-------------|
|   | Shenandoah Region             | Virginia    | U.S.        |
| 11-Forestry-Fishing-Hunting-Agriculture | 3.4%                          | -9.0%       | -6.1%       |
| 21-Mining                               | -14.3%                        | -12.7%      | -6.7%       |
| 22-Utilities                            | -3.7%                         | 14.2%       | 11.8%       |
| 23-Construction                         | -0.3%                         | -0.9%       | -1.1%       |
| 31-Manufacturing                        | -4.8%                         | -8.6%       | -9.4%       |
| 42-Wholesale Trade                      | -4.7%                         | -9.3%       | -7.2%       |
| 44-Retail Trade                         | -5.3%                         | -3.7%       | -2.5%       |
| 48-Transportation-Warehousing           | -0.6%                         | -1.2%       | 1.1%        |
| 51-Information                          | 13.5%                         | 16.2%       | 10.8%       |
| 52-Finance-Insurance                    | 5.8%                          | -1.3%       | 5.3%        |
| 53-Real Estate-Rental-Leasing           | 11.7%                         | 7.3%        | 6.5%        |
| 54-Professional-Scientific-Technical    | 13.0%                         | 12.3%       | 8.3%        |
| 55-Management                           | -11.6%                        | -4.8%       | 9.0%        |
| 56-Admin-Support-Waste-Remediation      | -1.6%                         | -6.3%       | -5.6%       |
| 61-Educational Services                 | 16.9%                         | 9.7%        | 9.6%        |
| 62-Health-Social Assistance             | 0.5%                          | 2.8%        | 4.4%        |
| 71-Arts-Entertainment-Recreation        | -4.0%                         | 2.1%        | 3.5%        |
| 72-Accommodation-Food Services          | 0.3%                          | 3.0%        | 0.1%        |
| 81-Other Services                       | 0.3%                          | -0.5%       | -0.7%       |
| 95-Auxiliaries                          | 17.2%                         | -14.7%      | -5.2%       |
| <b>AREA TOTALS</b>                      | <b>6.6%</b>                   | <b>4.8%</b> | <b>3.7%</b> |

*Unemployment<sup>81</sup>*

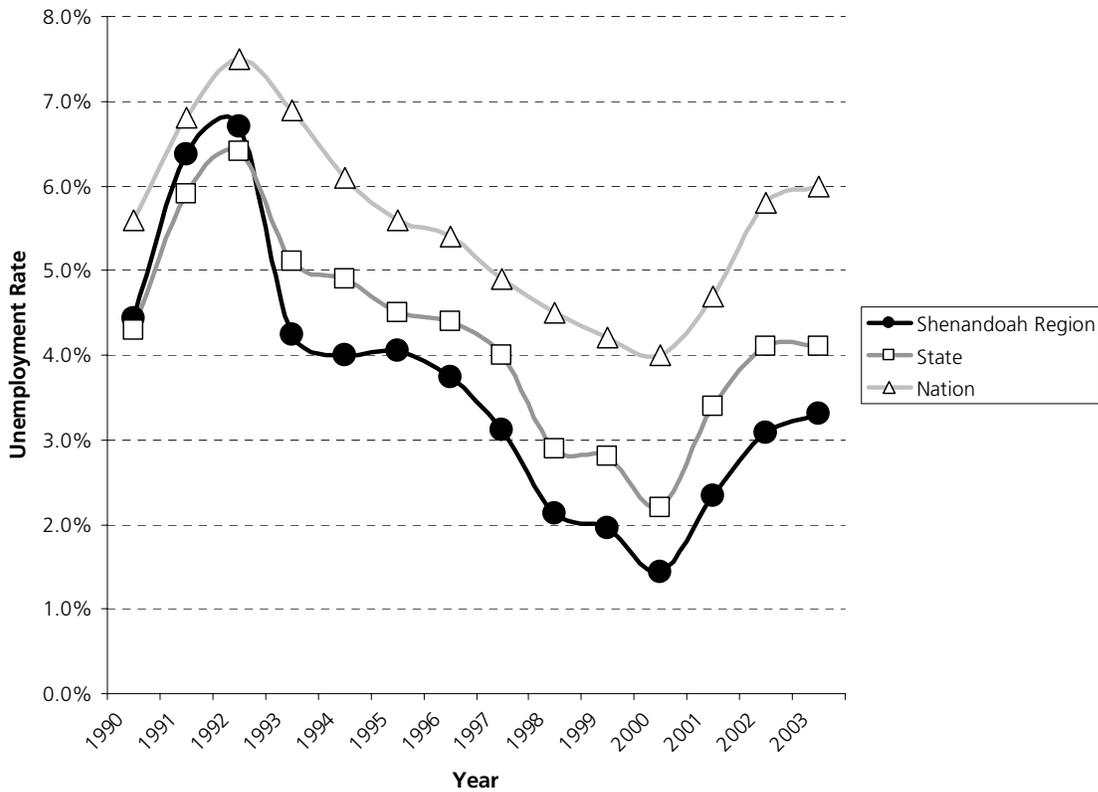
Annual unemployment rates were collected for all 20 counties composing the Shenandoah region, and for the state of Virginia and the U.S. for the years 1990 to 2003. In order to create annual unemployment rates for the Shenandoah region as a whole, county-level unemployment rates were weighted by each county's labor force then combined to form an unemployment rate representative of the Shenandoah region as a whole.

For the period 1990 to 2003, unemployment rates have been consistently lower in the Shenandoah region as compared to the state of Virginia and the U.S. (see Figure 6-15). The counties with the highest rates of unemployment in the region are Page County (averaging 7.3% for the period) and Warren County (averaging 5.3% for the period). In contrast, the counties with the lowest historic unemployment rates are Albemarle County (averaging 2.2% for the period) and Harrisonburg County (averaging 2.6% for the period).

The generally favorable employment outlook and historical trend for the region bodes well for park visitation and potential ATS usage, since as shown earlier in Figure 6-8, individuals who work full time are more likely to visit national parks on a regular basis as compared to those who are unemployed or retired.

<sup>81</sup> U.S. Department of Labor, Bureau of Labor Statistics. *Bureau of Labor Statistics Data*. URL <<http://www.bls.gov/data/home.htm>>.

**Figure 6-15**  
**Unemployment Rates**



*Wages and Income*<sup>82</sup>

There are three major measures of income data that are federally reported. The U.S. Census Bureau records data concerning “money income,” which includes only tangible money received and excludes non-cash benefits. The Bureau of Economic Analysis (BEA) records “personal income,” which is income received by all sources, net of social security contributions. This income measure records both monetary income (like wages) and non-monetary income (such as food stamps, rental values, etc). Finally, the Bureau of Labor Statistics (BLS) records wage and “annual pay” data. Annual pay is derived by dividing the total annual payroll of workers covered by unemployment insurance by the average monthly number of such employees.<sup>83</sup> Essentially, the BLS measure of income is the strictest measure of the three, as it excludes, for example, student workers, railroad employees, military employees, and the self-employed.

For the purpose of this analysis, it was decided to use the more narrow income measures available from the U.S. Census Bureau and BLS, as opposed to the broader BEA income measure. There is no reason to suspect any bias from not using the BEA estimates.

<sup>82</sup> U.S. Department of Labor, Bureau of Labor Statistics. *Average Annual Pay Technical Note*. URL <<http://www.bls.gov/news.release/annpay.tn.htm>>.

<sup>83</sup> U.S. Department of Labor, Bureau of Labor Statistics. *Average Annual Pay Technical Note*. URL <<http://www.bls.gov/news.release/annpay.tn.htm>>.

The BLS measure of average annual pay is useful since unemployment insurance coverage is extensive – representing 99.7% of all wage and salary civilian employment. The money income measure from the Census Bureau is also useful because it captures all monetary income types, as opposed to just “pay.” Also, the Census measure does not rely on unemployment insurance coverage. It should be noted that average annual pay data could be affected by a change in the ratio of full to part-time workers, as well as the ratio of high paid and low paid workers in a region. In any case, there is a significant positive correlation between money income and average annual pay measures.<sup>84</sup>

Average annual pay statistics for the Shenandoah region were computed by taking the weighted average (by population) of average annual pay for the 20 counties comprising the Shenandoah region. Ideally, the weights should consist of all the individuals in each county that the annual pay statistic is recorded for (such as civilian, non-self-employed, non-student workers). Unfortunately, identifying the exact number of these individuals for every county was not possible. In any case, the population statistics are most certainly highly correlated with those individuals covered by unemployment insurance.

At least since 1997, the Shenandoah region has had consistently lower levels of average annual pay income compared to the state and nation. In 2000, the Shenandoah region’s average annual pay was about \$27,200 per worker, compared to \$35,200 per worker for the state of Virginia and \$35,300 per worker nationwide. In 2003, Shenandoah’s average annual pay rose to \$30,200 per worker, however state and national annual pay also rose to \$38,600 and \$37,800, respectively (see Figure 6-16).<sup>85</sup>

These characteristics and trends are generally similar when money income provided by the U.S. Census Bureau is reviewed instead of the BLS data. However, the difference in incomes between the region, state, and nation are not nearly as pronounced when money income is used. Indeed, for the years analyzed, Shenandoah regional incomes are actually higher than either national levels in some cases, according to the Census. Three measures of money income are analyzed for the years 1989 and 1999: median household income, median family income, and per capita (money) income. A household is simply a collection of related or unrelated individuals living together. A family, in contrast, is a group of related individuals. The weights used to create these three statistics for the Shenandoah region were the 1990 and 2000 number of households by county, number of families per county, and population by county, respectively. Median household, median family, and per capita money income for the Shenandoah Region, Virginia, and the U.S. are reported in Table 6-8.<sup>86</sup>

For all three income measures shown in Table 6-8, Virginia has been consistently better off compared to either the Shenandoah region or the nation. In fact, the figures for the Shenandoah region are quite similar to those for the nation. Thus, while the BLS measure of annual pay shown earlier in Figure 6-16 showed the state and nation as having similar income levels with the Shenandoah region having lower income levels, the Census income data presented in Table 6-8 show both the Shenandoah region and the nation having lower incomes than the state of Virginia. Regardless of region, median family income values are larger than median household income values, which are still larger than per capita income values, since in each region there are fewer families than households, and fewer households than total persons.

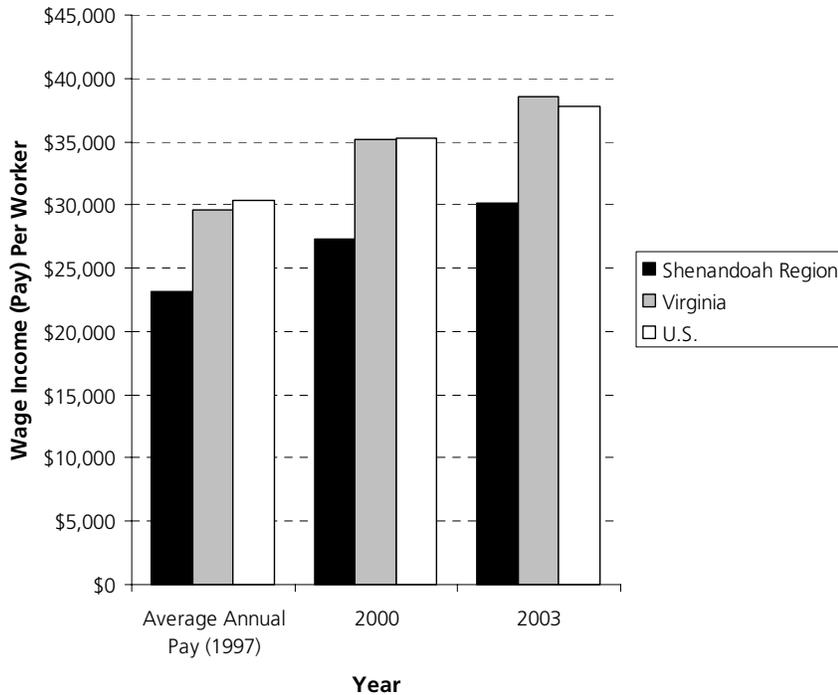
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<sup>84</sup> Wyoming Department of Employment. Research and Planning. *Average Annual Pay Per Job and Household Income by State, 1999*. URL <<http://doe.state.wy.us/lmi/0201/g1a1.htm>>.

<sup>85</sup> U.S. Department of Labor, Bureau of Labor Statistics. *Bureau of Labor Statistics Data*. URL <<http://www.bls.gov/data/home.htm>>.

<sup>86</sup> Based on data from the U.S. Department of Commerce, U.S. Census Bureau. *Decennial Census Data Sets*. URL <[http://factfinder.census.gov/servlet/DatasetMainPageServlet?\\_ds\\_name=DEC\\_1990\\_STF1\\_&\\_program=DEC&\\_lang=en](http://factfinder.census.gov/servlet/DatasetMainPageServlet?_ds_name=DEC_1990_STF1_&_program=DEC&_lang=en)>.

**Figure 6-16**  
**Wage Income (Pay) Per Worker**



**Table 6-8**  
**Median Income\***

| Region            | Median Household Income |          |                | Median Family Income |          |                | Per Capita Income |          |                |
|-------------------|-------------------------|----------|----------------|----------------------|----------|----------------|-------------------|----------|----------------|
|                   | 1989                    | 1999     | Percent Change | 1989                 | 1999     | Percent Change | 1989              | 1999     | Percent Change |
| Shenandoah Region | \$30,721                | \$42,630 | 38.8%          | \$35,667             | \$51,125 | 43.3%          | \$14,028          | \$21,505 | 53.3%          |
| State of Virginia | \$33,328                | \$46,677 | 40.1%          | \$38,213             | \$54,169 | 41.8%          | \$15,713          | \$23,975 | 52.6%          |
| U.S.              | \$30,056                | \$41,994 | 39.7%          | \$35,225             | \$50,046 | 42.1%          | \$14,420          | \$21,587 | 49.7%          |

\* Current dollars, unadjusted for inflation

As was shown earlier in Figure 6-7, income and park visitation are positively correlated. Therefore, since the Shenandoah region by most measure has relative lower income levels compared to other areas, visitation to Shenandoah National Park may be somewhat lower relative to other national parks in regions that have higher income levels, all else equal.

It is unlikely that park entrance fees act as a deterrent to park visitation at Shenandoah National Park. Research conducted by the NPS concludes that entrance fees are likely not a deterrent to

visitation because the vast majority of individuals think they are fair.<sup>87</sup> Additionally, the current daily entrance fee to Shenandoah Park is \$10 (vehicle fee), which is the national surveyed median according to the study. In fact, this and other fees such as annual passes are similar to, or in some cases cheaper, than that of both the nation and the northeast region.<sup>88</sup> Because the entry fees at Shenandoah National Park are relatively reasonable, Shenandoah region's somewhat lower income levels likely do not deter visitation to any great extent.

However, there are other costs incurred by potential park visitors that could make lower income levels a potential detractor to park visitation. Travel costs and gasoline prices, for example, may be high overall, or higher or lower relative to similar costs in other areas.

#### *Gasoline Prices*

One economic element that likely affects one's decision to visit Shenandoah National Park and other national parks is the price of gasoline. While gasoline prices specific to the Shenandoah region could not be determined based on the available data, Virginia's pre-tax gasoline prices were compared to the national average for the years 1999 to 2003 (see Figure 6-17)<sup>89</sup> Regular grade gasoline has consistently been approximately 3% cheaper in Virginia than the national average over the 5 year period. The five-year trend for both the state and nation has been upwards, with nominal gasoline prices increasing between 11 and 13% over the five year period 1999 to 2003, depending on the grade of gasoline.

A sizeable portion of gasoline's retail price is due to state and federal gasoline taxes. The federal gasoline tax is 18.4 cents per gallon. The state gasoline tax in Virginia is approximately 17.5 cents per gallon, which is approximately 3 cents per gallon cheaper than the average state gasoline tax collected in the United States. Thus, at least with respect to gasoline prices, national parks in the state of Virginia have a small advantage relative to parks in some other areas of the country with higher pre-tax and retail after-tax gasoline prices. Since a significant element of the visitor experience at Shenandoah National Park is the view afforded drivers while on Skyline Drive, somewhat lower relative gasoline prices are like a factor that positively affects the level of visitation to the park.

#### *Regional Development*

As another way of measuring economic expansion and growth trends in the region, residential construction permit data for the Shenandoah region for years 1990 to 2003 was reviewed (see Table 6-9). The construction permit data records the number of new units issued permits in a given timeframe by county, the cost of these units by county, and the type of structure (single family to 5+ unit buildings).

Growth in new housing in the Shenandoah region appears to be more volatile compared to the state or national market. For example, in 2002 the number of permits issued for residential building increased significantly in the Shenandoah region, only to then decrease substantially in 2003. While Shenandoah's population may be increasing at a rate faster than the state or nation, in contrast, the number of newly issued residential permits is not. The annual number of newly

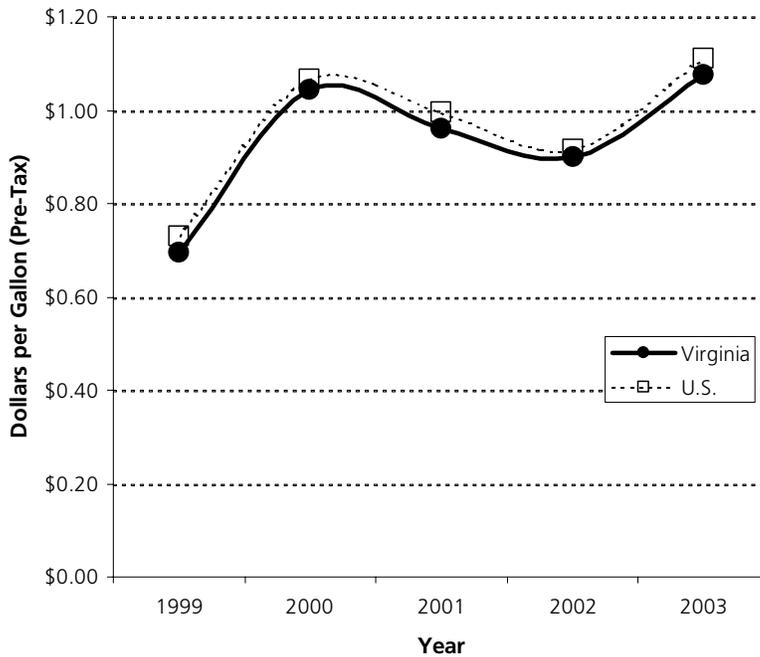
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<sup>87</sup> U.S. Department of the Interior. National Park Service. NPS Social Science Program. *The National Park Service Comprehensive Survey of the American Public - Technical Report*. June 2001. URL <<http://www.nature.nps.gov/socialscience/docs/NatSurvTechRep.pdf>>.

<sup>88</sup> U.S. Department of the Interior. National Park Service. *Entrance Fees*. URL <<http://www.nps.gov/shen/pphtml/fees.html>>.

<sup>89</sup> U.S. Department of Energy. Energy Information Administration. Office of Energy, Markets, and End Use. *EIA's Petroleum Product Prices for Virginia*. URL <[http://www.eia.doe.gov/emeu/states/oilprices/oilprices\\_va.html](http://www.eia.doe.gov/emeu/states/oilprices/oilprices_va.html)>. U.S. Department of Transportation. Federal Highway Administration. *Tax Rates on Motor Fuel*. URL <<http://www.fhwa.dot.gov/ohim/mmfr/deco2/mfr2rtpgr.htm>>.

**Figure 6-17**  
**Pre-Tax Retail Regular Grade Gasoline Prices (by Year and Area)**



**Table 6-9**  
**Residential Building Permits**

| Region            | Residential Building Permits Issued |           |                       |
|-------------------|-------------------------------------|-----------|-----------------------|
|                   | 1990                                | 2003      | % Change 1990 to 2003 |
| Shenandoah Region | 5,836                               | 7,326     | 25.5%                 |
| State of Virginia | 42,175                              | 55,996    | 32.8%                 |
| U.S.              | 1,110,800                           | 1,889,200 | 70.1%                 |

issued building permits in the Shenandoah region has grown by about 26% over the 14 year period, compared to the 33% and 70% for the state and nation respectively.

Looking closer at the most recent data, the slight drop that occurred in 2002 appears to be due to only a few counties. In fact, half of the counties in the region experienced gains in issued permits between 2002 and 2003. However, more than 60% of the decline from 2002 to 2003 can be attributed to reductions in Albemarle County, the most populous county in the analyzed region. Albemarle County had increased their newly issued permits in 2002 by 928, only to reduce their permit number by 695 in 2003. Winchester County experienced a similar pattern, albeit on a smaller scale, gaining 208 newly issued permits in 2002 over their 2001 total and losing 199 the

following year. In all, therefore, while the Shenandoah region reduced its newly issued permits by 5.5% during that timeframe, the state's issued permits fell by 4.5% and the nation's permit issuance actually increased by 8%.

### **Predicting Trends for Park Visitation and ATS Usage**

Overall, current regional characteristics that may have a negative effect on visitation relative to the state or nation include having a relatively less educated populace, having relatively higher levels of park pollution that affect visibility, and having relatively low regional per capita real income.

Current regional characteristics that may be having a positive effect on visitation include a relatively low unemployment rate, somewhat lower gasoline prices relative to other regions, and a relatively large white (non-minority) population relative to other regions.

Overall, trends that may have a negative effect on future visitation, should the trends continue, include a volatile and relatively slow-growing new housing market, a large and increasing number of divorced persons, and an increasingly large percentage of the population being age 65 or older. Trends that may have a positive effect on future visitation, should the trends continue, include a growing population, growth in per capita real income, continued low crime rates in the region, and an increase in the population who are highly-educated. These trends are often occurring not only in absolute terms, but also relative to other areas or regions.

It must be noted that any increases or decreases in park visitation will not translate directly into equivalent absolute changes in potential alternative transportation system use in the park. For example, a Shenandoah Park visitor study conducted over a one-week period in July of 2001 found that less than a quarter of those surveyed would be likely to ride shuttle buses in or around the park.<sup>90</sup> On the other hand, a single park visitor who does choose to use alternative transportation such as a potential shuttle bus may use this alternative transportation more than once during their visit (i.e., a single visitor may board a shuttle bus multiple times during a single park visit).

As noted earlier, the causality of the various relationships between socioeconomic characteristics and visitation is not always clear. It is also unclear which characteristics and trends are dominant in impacting visitation either negatively or positively. In order to properly assess these questions, significant statistical and econometric analysis would ideally be undertaken. However, as previously noted, this approach would be time-consuming, expensive, and have its own strengths and weaknesses as well. The analysis presented in this section has been meant to serve a useful, if less comprehensive, substitute to a more detailed but resource intensive study. The analysis contained herein is both quantitative and qualitative, and relatively broad in its discussion. In an August 2003 focus group report, Visiting Chief Social Scientist James Gramann of the NPS highlighted five points that NPS research must address in order to improve its ability to forecast visitation. The first 3 are paraphrased below:<sup>91</sup>

- (1) Track the characteristics of park visitors
- (2) Describe non-visitors and their reasons for not using parks and visitor facilities
- (3) Identify the significant factors influencing visitation

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<sup>90</sup> Littlejohn, Margaret. *Shenandoah National Park Visitor Study*. U.S. Department of Interior. National Park Service. Visitor Services Project. April 2002. URL <[http://www.psu.uidaho.edu/files/vsp/reports/127SHEN\\_rept.pdf](http://www.psu.uidaho.edu/files/vsp/reports/127SHEN_rept.pdf)>.

<sup>91</sup> Gramann, James H. *Visitation Forecasting and Predicting Use of NPS Parks and Visitor Centers: Focus Group Report*. U.S. Department of Interior. National Park Service. Social Science Program. August 2003. URL <[http://www.nature.nps.gov/socialscience/docs/NPS\\_Forecasting\\_Report.pdf](http://www.nature.nps.gov/socialscience/docs/NPS_Forecasting_Report.pdf)>.

This analysis that has been presented in this section addresses these three objectives, and in doing so, has offered some insights into the Shenandoah region, future visitation at Shenandoah National Park, and potential future ATS demand at Shenandoah National Park.

### **Potential Areas for Future Study**

There were also two other points noted in the focus group report noted above that NPS research must address in order improve the ability to forecast visitation:

- (1) To understand the effects on demand of crowding, congestion, reservations, etc.
- (2) To identify factors affecting visitation to different types of NPS units

This analysis did not address these areas. For the most part, nationwide data regarding these issues are not readily available. Future research might better explore questions related to the determinants of park visitor demand, such as congestion and crowding, at different types of NPS units. For example, why do one million people visit a certain park one year, but 1.1 million people visit the same park during a different year? One approach to answering this question and gaining a better quantitative understanding of the determinants of park visitor demand would be to utilize a multivariate statistical analysis in order to investigate the correlation between the hypothesized determinants of park visit demand and the level of visitation. Possible explanatory variables that could be used in such an approach, and that may also be practical to obtain data for, might include:

- national/state/regional economic conditions
- national/state/regional demographic characteristics
- national/state/regional gasoline prices
- national/state/regional overall travel levels
- geographic factors such as the location of the park relative to populated areas
- the type of park (e.g., national seashore, historic park, etc.)
- the physical size (area) of the park
- amount of park entrance fees (if any)
- park crowding, traffic congestion
- weather and climate (e.g., a particular cold/hot/wet year or season, etc.)

A better understanding of the determinants of park visitor demand would be useful not only for alternative transportation systems planning, but likely other purposes as well, such as facilities planning and planning for staffing requirements.

## Appendix A: Stakeholder Interview Summaries

A complete listing of notes from the stakeholder interviews conducted by the Volpe Center study team.

### Stakeholder Interview Summaries

| Stakeholder Organization   | Stakeholder Mission  | POC(s)        | Meeting Thumbnail                                  |
|--|--|---------------|--|
| Virginia Tourism Corporation   | Support, maintain, and expand Virginia's domestic and international travel market. | Martha Steger | Telephone interview by Eric Plosky and Carson Poe. |
| <b>Stakeholder Description</b>   |  |               |  |
| Virginia Tourism Corporation does not have information regarding the expectations or preparedness of Shenandoah National Park (SHEN) visitors. This type of research is typically left up to the location.   |  |               |  |
| <b>Traveler Information Resources</b>  |  |               |  |
| There are 44 local and regional Visitor Centers, as well as 10 State Welcome Centers at which traveler brochures can be found. Data concerning the type and number of brochures that visitors take is maintained by each Center. International visitors usually learn about SHEN via travel agencies, computers, and airlines. |  |               |  |
| <b>Additional Interview/Meeting Notes</b>  |  |               |  |
| (None)   |  |               |  |

**Stakeholder Interview Summaries** *(continued)*

| Stakeholder Organization   | Stakeholder Mission | POC(s)      | Meeting Thumbnail                                  |
|--|---------------------|-------------|--|
| <b>WFTR Oldies 95.3</b>  |                     | Mike O'Dell | Telephone interview by Eric Plosky and Carson Poe. |
| <b>Stakeholder Description</b>   |                     |             |  |
| WFTR Oldies 95.3 broadcasts to a primary audience consisting of those 30 years old and older. The range of broadcast signal is approximately 40 miles. The station advertises on its website, at the Chamber of Commerce, and in Front Royal.  |                     |             |  |
| <b>Traveler Information Resources</b>  |                     |             |  |
| <p>From Noon to 1:00 pm, WFTR has a news program that recaps local, state and national news. During this one-hour block, the last 30 minutes are dedicated to a section called “Valley Today,” a program that gives local businesses and organizations the opportunity to promote and highlight upcoming events. The station has a standing agreement with local Chambers of Commerce to broadcast public service announcements (PSA). WFTR will make PSAs on information sent to them via fax and email. Information received via telephone is also broadcast. Although the station has no participation in 511 Virginia, it does have metro traffic reports. Listeners will call in with information about metro traffic in D.C.</p> <p>WFTR also has an agreement with the local television provider to broadcast on Channel 23. On the TV channel, local ads and events information, news pages, and weather reports rotate every 15 minutes.</p> <p>Most visitors to the region know the difference between SHEN and Skyline Drive.</p> |                     |             |  |
| <b>Additional Interview/Meeting Notes</b>  |                     |             |  |
| The station is unaware of events that might allow it to tie into SHEN but would be interested in learning about how it could provide SHEN-related information.   |                     |             |  |

**Stakeholder Interview Summaries** *(continued)*

| Stakeholder Organization  | Stakeholder Mission   | POC(s)           | Meeting Thumbnail                  |
|---|---|------------------|------------------------------------|
| <b>Winchester-Frederick County Chamber of Commerce</b>  | Support economic development in the region by representing the interests of business in the government arena. | Patrick Coughlin | Telephone interview by Carson Poe. |
| <b>Stakeholder Description</b>  |   |                  |                                    |
| Winchester-Frederick County is not an ultimate destination of visitors. Generally, travelers to the county are from Virginia, do not have rigid schedules, and are flexible in their travel planning.   |   |                  |                                    |
| <b>Traveler Information Resources</b>   |   |                  |                                    |
| Winchester-Frederick County Chamber of Commerce does not collect data on visitors or visitor information. Under the impression that visitors do not know difference between Skyline Drive and SHEN or between Skyline Drive and the Blue Ridge Parkway. Contact between SHEN and the Chamber is not on a regular basis. The Chamber does receive some phone calls from people seeking information about SHEN. |   |                  |                                    |
| <b>Additional Interview/Meeting Notes</b>   |   |                  |                                    |
| Given the natural resources and beauty in the region, the Chamber is trying to determine opportunities for conservation partnerships between regional universities and parks. Wonders if SHEN could participate.  |   |                  |                                    |

**Stakeholder Interview Summaries** *(continued)*

| Stakeholder Organization  | Stakeholder Mission  | POC(s)            | Meeting Thumbnail                         |
|---|--|-------------------|---|
| <p><b>Greater Augusta Chamber of Commerce</b></p>   | <p>To work together to enhance quality of life by promoting the viability of business, commerce and industry in the Greater Augusta region of the Shenandoah Valley.</p> | <p>Ben Carter</p> | <p>Telephone interview by Carson Poe.</p> |
| <p><b>Stakeholder Description</b></p>   |  |                   |   |
| <p>Augusta County is located to the southwest of SHEN. Travelers to the county are typically “Point A to Point B” travelers and usually are not looking for things to do in Augusta County on that day. For this reason, the Chamber is unaware as to whether travelers are informed about SHEN and the region.</p> |  |                   |   |
| <p><b>Traveler Information Resources</b></p>  |  |                   |   |
| <p>The Greater Augusta Chamber of Commerce rarely, if ever, maintains communication (phone, email, fax) with the park. However, the Chamber is not opposed to increasing communication.</p>   |  |                   |   |
| <p>Many visitors entering SHEN from the south at Rockfish Gap do not seem to know the difference between Skyline Drive and the Blue Ridge Parkway. They are often surprised that they must pay to continue northwards on Skyline Drive.</p>   |  |                   |   |
| <p><b>Additional Interview/Meeting Notes</b></p>  |  |                   |   |
| <p>The Greater Augusta Chamber of Commerce is not averse to exploring partnership opportunities with SHEN.</p>  |  |                   |   |

**Stakeholder Interview Summaries** *(continued)*

| Stakeholder Organization  | Stakeholder Mission  | POC(s)                 | Meeting Thumbnail                  |
|---|--|------------------------|------------------------------------|
| <b>Winchester-Frederick Convention and Visitors Bureau</b>  | Support the Winchester/Frederick County Economic Development Commission. | Melanie Stepp-Coughlin | Telephone interview by Carson Poe. |
| <b>Stakeholder Description</b>  |  |                        |                                    |
| The Winchester-Frederick C&VB is located approximately 20 miles north of the Front Royal (North) Entrance Station to SHEN.  |  |                        |                                    |
| <b>Traveler Information Resources</b>   |  |                        |                                    |
| <p>The Winchester-Frederick C&amp;VB collects visitor data in a guestbook. The guestbook includes a section where visitors can write down the purpose of their travel. Thirty-three percent of these visitors are on day-trips. Most travelers arriving to the C&amp;VB fall into one of the following two groups: 1) Unprepared, or 2) Prepared but are lost. The second group is comprised of two sub-groups: 1) Northbound travelers on I-81 who have missed I-66 (SHEN signage is not capturing this group), and 2) Southbound I-81 travelers asking “Am I there yet?” Assurance signage, perhaps 50 miles out, might be beneficial here. Overall, none of these groups distinguishes Skyline Drive from SHEN or the Blue Ridge Parkway, and they are generally unaware of the speed limit and time required to drive through the Park. Visitor expectations are not being managed. The three visitor comments most heard include: 1) unaware of the SHEN charge, 2) unaware of SHEN’s limited access, 3) surprise at Skyline Drive speed limit.</p> <p>The C&amp;VB does not maintain communication with the park.</p> |  |                        |                                    |
| <b>Additional Interview/Meeting Notes</b>   |  |                        |                                    |
| The Winchester-Frederick C&VB suggests SHEN consider developing closer interaction with regional entities. A regional stakeholders partnership group that allows SHEN and its regional stakeholders to discuss issues might be an option. Currently, there are some quarterly and annual informational and educational meetings that the regions C&VBs attend.  |  |                        |                                    |

**Stakeholder Interview Summaries** *(continued)*

| Stakeholder Organization  | Stakeholder Mission                           | POC(s)              | Meeting Thumbnail                  |
|---|---|---------------------|------------------------------------|
| <b>Shenandoah Valley Travel Association</b>   | Promote attractions in the Shenandoah Valley. | Merriweather German | Telephone interview by Carson Poe. |
| <b>Stakeholder Description</b>  |   |                     |                                    |
| The Shenandoah Valley Travel Association (SVTA) is located in New Market, VA, 42 miles west of the Thornton Gap Entrance Station to SHEN. SVTA has 80 years experience in promoting its non-profit members, including Aramark.  |   |                     |                                    |
| <b>Traveler Information Resources</b>   |   |                     |                                    |
| Neither Shenandoah Valley visitors nor residents distinguish Skyline Drive from SHEN or the Blue Ridge Parkway. SVTA receives many phone calls from people asking for SHEN information. Communication with SHEN is very participatory. As soon as news is released from the park, it is faxed to SVTA. There are also quarterly meetings that SHEN attends. |   |                     |                                    |
| <b>Additional Interview/Meeting Notes</b>   |   |                     |                                    |
| (None)  |   |                     |                                    |

**Stakeholder Interview Summaries** *(continued)*

| Stakeholder Organization  | Stakeholder Mission   | POC(s)                    | Meeting Thumbnail                         |
|---|---|---------------------------|---|
| <p><b>Rappahannock-Rapidan Regional Commission</b></p>  | <p>Provide professional planning and technical resources, a concerted approach to regional cooperation, planning assistance with program delivery, and a forum for the interaction of appointed and elected local government officials and citizen members.</p> | <p>Mark van der Water</p> | <p>Telephone interview by Carson Poe.</p> |
| <p><b>Stakeholder Description</b></p>   |   |                           |   |
| <p>The Rappahannock-Rapidan Regional Commission (RRRC) encompasses the counties of Culpeper, Fauquier, Madison, Orange, and Rappahannock, each county located to the east of SHEN. Madison and Rappahannock counties, which directly border SHEN, have a population of approximately 7,000 people. In the past, these counties have not encouraged visitation to the area.</p>  |   |                           |   |
| <p><b>Traveler Information Resources</b></p>  |   |                           |   |
| <p>It has been a challenge for RRRC to obtain data on visitor preparedness and preferences due to the counties' relationship with SHEN. Some residents are still disgruntled from takings made during the formation of the park, while some would like to see different park access alignments. Others do not seem to want to promote the park as an asset to their counties; this has been "the great mystery of the region."</p> <p>Many who visit SHEN do not know they are actually in the park; 55,000 people climbed Old Rag Mountain in 2003, and many did not know the mountain is in the park. Many also associate Skyline Drive as an October drive through route, not as a year-round getaway.</p> |   |                           |   |
| <p><b>Additional Interview/Meeting Notes</b></p>  |   |                           |   |
| <p>RRRC is willing to work with SHEN to help in the efforts to get information to travelers.</p>  |   |                           |   |

**Stakeholder Interview Summaries** *(continued)*

| Stakeholder Organization   | Stakeholder Mission   | POC(s)               | Meeting Thumbnail                         |
|--|---|----------------------|---|
| <p><b>Nelson County Department of Economic Development and Tourism</b></p>   | <p>Increase and enhance the county's tax base, support and encourage tourism as a viable means to diversify the local economy, and recognize the importance of the county's agricultural economy as an integral part of Nelson's economic heritage and current economy.</p> | <p>Maureen Corum</p> | <p>Telephone interview by Carson Poe.</p> |
| <p><b>Stakeholder Description</b></p>  |   |                      |   |
| <p>Nelson County's Department of Economic Development and Tourism (Nelson Co. EDT Department). Located in Lovingson, VA, about 18 miles south of the Rockfish Gap (South) Entrance Station to SHEN.</p>  |   |                      |   |
| <p><b>Traveler Information Resources</b></p>   |   |                      |   |
| <p>Regional Welcome Centers collect information on visitor destinations. SHEN visitors from Nelson County are typically interested in outdoor activities and are more informed than visitors who arrive to drive through the park. Many of the driving visitors stop at the regional welcome center looking for SHEN information. These visitors existing knowledge of SHEN has been mainly acquired on the Internet. Most visitors do not understand the difference between Skyline Drive and SHEN or the Blue Ridge Parkway, and they arrive asking why it costs \$10 to travel north but is free to drive south. North travelers are also unaware of Skyline Drive's limited accessibility. Since SHEN is not in contact with the Nelson Co. EDT Department, Nelson Co. must reach out to the park to get information (on road conditions, events, etc.).</p> |   |                      |   |
| <p><b>Additional Interview/Meeting Notes</b></p>   |   |                      |   |
| <p>The Department of Economic Development and Tourism suggests an accreditation process for visitor centers. This process could describe and/or standardize the information that visitor centers must provide.</p>   |   |                      |   |

**Stakeholder Interview Summaries** *(continued)*

| Stakeholder Organization  | Stakeholder Mission   | POC(s)          | Meeting Thumbnail                  |
|---|---|-----------------|------------------------------------|
| <b>Charlottesville-Albemarle Chamber of Commerce</b>  | Represent private enterprise, to promote business and enhance the quality of life in the greater Charlottesville communities. | Timothy Hulbert | Telephone interview by Carson Poe. |
| <b>Stakeholder Description</b>  |   |                 |                                    |
| Many visitors to the region visit Monticello and never see Charlottesville’s historic downtown. The Chamber has been focused on promoting tourism growth in the city.   |   |                 |                                    |
| <b>Traveler Information Resources</b>   |   |                 |                                    |
| The Charlottesville-Albemarle Chamber of Commerce website gets approximately 350,000 hits per year. Most of the site visitors want information about the Charlottesville area. However, the Chamber fields phone calls regarding SHEN. Generally, these SHEN visitors are under-subscribed to information about SHEN and arrive to the park unprepared. Many SHEN visitors are have the misconception that Skyline Drive is an artery of fast transportation. They are unaware that Skyline Drive is more of a roadway for a scenic stroll. |   |                 |                                    |
| <b>Additional Interview/Meeting Notes</b>   |   |                 |                                    |
| (1) The Chamber intends on improving its visitor data collection efforts.<br>(2) Approximately 1,000,000 people visit Charlottesville annually for sporting events and medical services at the University of Virginia. Many of these visitors make day trips to SHEN. The park may be unaware that this traveler cohort exists.   |   |                 |                                    |

**Stakeholder Interview Summaries** *(continued)*

| Stakeholder Organization  | Stakeholder Mission | POC(s)         | Meeting Thumbnail  |
|---|---------------------|----------------|--|
| Shenandoah National Park  |                     | Sandra Rushing | Meeting at SHEN Headquarters, 12-10-03. Interviewed by Eric Plosky and Carson Poe. |
| <b>Stakeholder Description</b>  |                     |                |  |
|   |                     |                |  |
| <b>Traveler Information Resources</b>   |                     |                |  |
| <p>SHEN approves the concessionaire’s brochure advertising the park. However, if the brochure is deemed too long, the concessionaire decides what information is to be taken out.</p> <p>Calls to park headquarters requesting information spike on Thursdays and Fridays. The interaction and questions in these calls have not changed during the seven years that Sandra has answered them. For in depth information, callers are referred to SHEN’s website. If no one is in the office, callers hear a menu over the voice mail. On the menu, there is an option for weather and another for road conditions. This information is updated daily by the Communications Office/Dispatch Division.</p> <p>People do not know much about the park except that it will be open and ready for them at all times. They assume the information they have gathered by word-of-mouth is accurate and that there will be whatever amenities they want. Visitors do not distinguish between park staff and concessionaire staff. The concessionaire staff, although wearing uniforms, is not trained to do SHEN interpretation. Furthermore, visitors do not distinguish between Skyline Drive and the Blue Ridge Parkway, nor do they understand the limited access nature of the park.</p> |                     |                |  |

**Stakeholder Interview Summaries** *(continued)*

| Stakeholder Organization   | Stakeholder Mission  | POC(s)      | Meeting Thumbnail   |
|--|--|-------------|---|
| <b>Front Royal Visitors Center</b>   | Provide visitors with information about attractions in Front Royal and the region. | Don LeFever | Meeting at the Front Royal Visitor Center on 12-11-03. Interviewed by Eric Plosky and Carson Poe. |
| <b>Stakeholder Description</b>   |  |             |   |
| Front Royal is located at the north end of SHEN. Front Royal is the only town that shares a border with the park, and one of the park's four entrance stations is located here. The Visitors Center gets approximately 40,000 visitors per year, while the Front Royal park entrance gates sees approximately 400,000.   |  |             |   |
| <b>Traveler Information Resources</b>  |  |             |   |
| <p>The biggest disappointment that visitors show occurs when they arrive to Front Royal and find that SHEN is closed (due to weather and/or nighttime). Some visitors call the Front Royal Visitors Center beforehand to find out conditions at the park. Most of these calls are calls that should be directed to the park. Often people ask whether there is a 1-800 number for SHEN. When the park is closed due to weather, the Front Royal entrance gate often cannot provide a target for reopening. When SHEN is closed, the Visitors Center recommends George Washington National Forest to visitors.</p> <p>Many people watch the local television information station – Channel 23. Particularly helpful are the up-to-date weather reports.</p> <p>Visitors do not understand the differences between Front Royal and SHEN or between Skyline Drive and SHEN and the Blue Ridge Parkway. They also have no idea of the time required to drive through the park.</p> <p>Bus tour operators communicate with the Visitors Center before arriving. Typically, the operators leave a message describing the date and time of arrival (if this information is available). Perhaps they could communicate better with SHEN.</p> |  |             |   |

**Stakeholder Interview Summaries** *(continued)*

| Stakeholder Organization  | Stakeholder Mission   | POC(s)      | Meeting Thumbnail  |
|---|---|-------------|--|
| <b>Luray-Page County Chamber of Commerce</b>  | To enhance and promote the economic environment of Page County. | Lori Nealis | Meeting at the Luray-Page County Chamber of Commerce on 12-11-03. Interviewed by Eric Plosky and Carson Poe. |
| <b>Stakeholder Description</b>  |   |             |  |
| Page County is located to the west of SHEN in the Shenandoah Valley. SHEN's Thornton Gap Entrance Station is approximately 10 km from Luray.  |   |             |  |
| <b>Traveler Information Resources</b>   |   |             |  |
| <p>Roughly 14-15,000 visitors come to Luray, VA annually. This compares to 500,000 visitors to Luray Caverns and 1.2 million to SHEN. The Luray-Page County Chamber of Commerce maintains communication with the park through personal connection, phone and email conversations, and SHEN's road conditions phone number.</p> <p>Some visitors to the region do not have a conception of what SHEN is. They arrive in Luray thinking SHEN is comparable to an amusement park. A small number of visitors have done some trip planning and expect the "rural experience."</p> <p>Generally, visitors are unaware of the limited access nature and road conditions/weather of Skyline Drive. The Chamber fields many phone calls from potential visitors asking for directions from Washington, D.C. and road condition information. Visitors are also unaware of how quickly conditions can change on Skyline Drive. Even on clear days, the haze can be surprising to visitors unfamiliar with the area. Accompanying this unawareness is the misconception of many that the Shenandoah River flows down from Skyline Drive.</p> <p>The Chamber notes that some visitors have expressed interest in bus service that originates on Skyline Drive and takes visitors down into the valley for day trips to attractions such as Luray Caverns.</p> |   |             |  |

**Stakeholder Interview Summaries** *(continued)*

| Stakeholder Organization  | Stakeholder Mission | POC(s)         | Meeting Thumbnail   |
|---|---------------------|----------------|---|
| Aramark   |                     | Mike Slowinski | Meeting at Aramark Headquarters with Mike Slowinski and three Aramark staff on 12-10-03. Interviewed by Eric Plosky and Carson Poe. |
| <b>Stakeholder Description</b>  |                     |                |   |
| Aramark is the long-standing concessionaire for SHEN. Aramark headquarters is located in Luray, VA, west of the Thornton Gap entrance station. Aramark, which employs 150 workers – 50 percent of which live in the park – spends approximately \$350,000/yr advertising and marketing SHEN (park approves all marketing), while managing 650 campsites, 300 rooms, gift shops, horse stables, and other facilities.  |                     |                |   |
| <b>Traveler Information Resources</b>   |                     |                |   |
| Aramark also fields roughly 92,000 SHEN-related phone calls annually. The topics of these calls requesting information, in order, are: (1) directions, (2) shuttle service inquiries, (3) tour information, (4) camping.  |                     |                |   |
| At Big Meadows, the only SHEN campgrounds that accept reservations, many older visitors have requested a transportation service to Rapidan Camp. Younger visitors have requested transport to Old Rag, Luray Caverns, and Monticello. The concessionaire, which does some step-on guide service tours due to staffing and resource limitations at SHEN, notes that it could provide an audio tour to Rapidan Camp as well as set up a system to take tour reservations. |                     |                |   |
| <b>Additional Interview/Meeting Notes</b>   |                     |                |   |
| (None)  |                     |                |   |

**Stakeholder Interview Summaries** *(continued)*

| Stakeholder Organization  | Stakeholder Mission | POC(s)         | Meeting Thumbnail  |
|---|---------------------|----------------|--|
| Shenandoah National Park  |                     | Tracy Thetford | Meeting at SHEN Headquarters on 12-10-03. Interviewed by Eric Plosky and Carson Poe. |
| <b>Stakeholder Description</b>  |                     |                |  |
|   |                     |                |  |
| <b>Traveler Information Resources</b>   |                     |                |  |
| <p>SHEN's Entrance Station radio station is 1610 AM. There are three radio stations, one at the Rockfish Gap Entrance Station, one at the Thornton Gap Entrance Station, and one at the Front Royal entrance station. At its best, the broadcast radius is 2-3 miles, but the Thornton Gap radio station has experienced some malfunctioning. The broadcast recording, which changes at different times of the year depending on long-term facility status (e.g., road closures by section from 5pm-8am in Nov.-Jan.), loops every six minutes. The recording is not changed for short-term events, such as snow.</p> <p>In the south, the station is shared with the Blue Ridge Parkway, and here each park limits their recording to three minutes. SHEN recently placed a sign at the Rockfish Gap (South) Entrance Station's radio station announcing the shared radio station. With the sign in place, use of the station rose dramatically – Entrance Station staff noted an increase in visitors listening to the broadcast. In fact, staff estimate that 90 percent of those entering the park were tuned to 1610 in the period after the sign was posted.</p> <p>Many SHEN visitors are returning, local visitors who are better prepared than out of town visitors.</p> |                     |                |  |

**Stakeholder Interview Summaries** *(continued)*

| Stakeholder Organization  | Stakeholder Mission | POC(s)         | Meeting Thumbnail   |
|---|---------------------|----------------|---|
| Shenandoah National Park  |                     | Charlie Newton | Lunch meeting on 12-10-03. Interviewed by Eric Plosky and Carson Poe. |
| <b>Stakeholder Description</b>  |                     |                |   |
|   |                     |                |   |
| <b>Traveler Information Resources</b>   |                     |                |   |
| <p>The 999-3451 number should be more visible on then SHEN map.</p> <p>Visitors are often surprised that they have to pay to use Skyline Drive. Visitors also don't differentiate between Skyline Drive and Shenandoah National Park.</p> |                     |                |   |
| <b>Additional Interview/Meeting Notes</b>   |                     |                |   |
| (None)  |                     |                |   |

**Stakeholder Interview Summaries** *(continued)*

| Stakeholder Organization   | Stakeholder Mission | POC(s)            | Meeting Thumbnail   |
|--|---------------------|-------------------|---|
| Shenandoah National Park   |                     | Karen Beck-Herzog | ATP meeting at SHEN Headquarters on 12-10-03. SHEN, Volpe Center, Aramark, and FHWA staff attended the meeting. |
| <b>Stakeholder Description</b>   |                     |                   |   |
| <p>Overlooks in varying condition<br/>                     Minimal signage<br/>                     Park staff remove snow<br/>                     Traffic accidents not a problem but speeding is<br/>                     Fall is peak season – foliage. During this time 60-70% of buses. School buses have fee waived – arranged ahead of time.</p> |                     |                   |   |
| <b>Traveler Information Resources</b>  |                     |                   |   |
| <p>Karen Michaud noted that there is too much signage at the entrance stations, and that the park has slowly been removing and consolidating signs since 1995.</p>   |                     |                   |   |
| <b>Additional Interview/Meeting Notes</b>  |                     |                   |   |
| (None)   |                     |                   |   |

**Stakeholder Interview Summaries** *(continued)*

| Stakeholder Organization  | Stakeholder Mission | POC(s)             | Meeting Thumbnail   |
|---|---------------------|--------------------|---|
| Staunton Convention and Visitors Bureau   |                     | Sergei Troubetzkoy | Meeting on April 1, 2004 with Eric Plosky and Carson Poe. Joint interview with Matt Burt of Battelle. |
| <b>Stakeholder Description</b>  |                     |                    |   |
| 15 minutes from Skyline Drive and Blue Ridge Parkway, two roads that visitors lump together.  |                     |                    |   |
| <b>Traveler Information Resources</b>   |                     |                    |   |
| <p>Visitors unaware of SHEN location – “where’s Atlanta?” or “Where’s Raleigh?”<br/> Hard to get information from the park in great quantity.<br/> Staunton C&amp;VB distributes roughly 1000 brochures per attraction in a month.<br/> Locals may not be aware of 511 Virginia as other regional travelers.<br/> Truck traffic complaints on I-81<br/> International travelers more prepared. American visitors – no hotel reservations, open-ended traveling.<br/> Wish they had known length of Skyline Drive. Unaware of terrain of the drive.<br/> Local radio is very clear and informative, though it is hard to determine how often it is used. There are four transmitters for the station (maintained by Staunton C&amp;VB budget). Message is updated weekly. Promotions to those who mention station. Some cars may not be able to reach 1610 AM on their tuner.<br/> Communication with park is via phone and fax.<br/> VC at Afton Mountain not for Skyline and Blue Ridge Parkway, though visitors think that it is.</p> <p>Staunton was skeptical to 511 Virginia because it already had radio information that no one uses. Do we want this? Is it a waste of time?<br/> Nationwide program might elevate the awareness and use of 511 Virginia.</p> |                     |                    |   |

**Stakeholder Interview Summaries** *(continued)*

| Stakeholder Organization   | Stakeholder Mission  | POC(s)                 | Meeting Thumbnail   |
|--|--|------------------------|---|
| <p><b>Harrisonburg/Rockingham Convention and Visitors Bureau</b></p>   | <p>Serve as the fullest possible provider of information to the public, with the intention to increase tourism in the region by providing ever-changing information, giving businesses the opportunity to grow economically, and to enhance the quality of life for the local community.</p> | <p>Allison Coonley</p> | <p>Meeting at hotel conference room in Harrisonburg, VA on April 1, 2004. Joint interview with Matt Burt of Battelle.</p> |
| <p><b>Stakeholder Description</b></p>  |  |                        |   |
| <p>Harrisonburg is located 21 miles west of SHEN’s Swift Run Gap Entrance Station. The city has a population of approximately 44,000, of which, 15,000 are James Madison University students. In 2003, travelers spent approximately \$57 million in Rockingham County. The county also sees many time-share visitors – roughly 1000 to 4000 per week.</p> <p>Harrisonburg visitation is steadily growing, as opposed to the attenuating park visitation. The 2020 Rockingham County Comprehensive Plan has one objective of pulling people away from the park and into the county.</p>  |  |                        |   |
| <p><b>Traveler Information Resources</b></p>   |  |                        |   |
| <p>The Harrisonburg/Rockingham C&amp;VB uses the Internet as a way to market to visitors before they arrive in the region. Once visitors arrive, the Traveler Information Center (TIC) has been helpful in distributing information on Shenandoah Valley, SHEN, and Skyline Drive. Before September 11, 2001, the TIC had approximately 100 people visit per day. Since then, visitation is around 50 people per day. Questions asked at the TIC are typically specific in nature, with the most predominant ones pertaining to: directions (70% would like map of Harrisonburg), local attractions, the civil war battlefields, and Mennonite farmers markets. The major complaint of visitors to the TIC is that it is too far from the highway.</p> <p>SHEN communicates with the Harrisonburg/Rockingham C&amp;VB via telephone and faxed press releases.</p> <p>The C&amp;VB first became aware of 511Virginia after Shentel visited. Harrisonburg/Rockingham C&amp;VB was interested because their travel brochures “weren’t exactly flying off the shelves.” To date, 511Virginia has just scratched the surface of traveler information dissemination; it needs to be promoted to locals, as most promotion has been aimed at visitors. The C&amp;VB is not averse to 511Virginia posting information on congestion problems and/or occurrences in the area.</p> |  |                        |   |

**Stakeholder Interview Summaries** *(continued)*

| Stakeholder Organization  | Stakeholder Mission | POC(s)  | Meeting Thumbnail  |
|---|---------------------|---|--|
| 511/Virginia  |                     | Rich Church, David<br>Ferguson, Scott<br>Cowherd, Sandy Myers | Meeting on April 2, 2004 with representatives from VDOT, Shentel (511 Virginia), and Battelle. FHWA VA and Battelle had representatives participating via phone. |
| <b>Stakeholder Description</b>  |                     |   |  |
|   |                     |   |  |
| <b>Traveler Information Resources</b>   |                     |   |  |
| <p>According to a VTTI report, user satisfaction survey – 95% would use again. 19% have heard of 511. 8% have used. Main focus = 71% looking for traffic related information.</p> <p>Marketing – blue signs biggest source of 511 I.D. Two billboards. Gas pump decals. Considering tying 511 ads to lottery ads. Have been pushing 13 Welcome Centers, each with 511 rack-cards, to describe the 511 Virginia system and service to visitors.</p> <p>Local VTC channels have seen 511 as competition instead of potential collaborative partner. 511 is not competition because VDOT is not in tourism business.</p> <p>There are many things that Shentel can do at minimum cost.</p> |                     |   |  |

**Stakeholder Interview Summaries** *(continued)*

| Stakeholder Organization   | Stakeholder Mission | POC(s)   | Meeting Thumbnail   |
|--|---------------------|--|---|
| <p><b>Shenandoah National Park / 511Virginia (VDOT, ShenTel)</b></p>   |                     | <p>Karen Beck-Herzog, Rich Church, Scott Cowherd</p> | <p>Meeting at SHEN Headquarters on May 14, 2004. Attended by SHEN, 511Virginia, and Volpe Center representatives.</p> |
| <p><b>Traveler Information Resources</b></p>   |                     |  |   |
| <p>SHEN - has license plate cameras at Entrance Stations. Track visitors coming in but not exiting. Uses narrowband radio – contacting phone company to determine need for receivers. Centralized dispatch. Park is open to link on site to 511Virginia, enhance visitors ability to get to park.</p> <p>National Park Pass - \$50 SHEN Pass - \$20 Challenges – SHEN starts each year in a budget deficit. Lose approximately seven full-time equivalent (FTE) per year. Aramark already in phone tree (sponsor the \$40/month fee).</p> <p>511Virginia (VDOT, ShenTel) – hopes to get smaller roads. Now I-81. can do call transfer. 511Virginia pays for call transfer costs, not caller. Transfer to SHEN’s system is not a problem. Currently, information flows from the state police (shows up and verifies traffic incident) to VTTI to 511Virginia. NC/TN will begin 511 service in 2004. Challenge: website cannot necessarily be set to update daily to reflect park road conditions – weekends, etc.)</p> <p>Park could update all text then discriminate who gets what. Would need go regional – 3 park regions. Electronic speedometers like Blue Ridge Parkway?</p> |                     |  |   |

## **Appendix B: Additional Collected Data**

An annotated listing of data collected during stakeholder interviews.

### **Shenandoah National Park 1998 Visitor Survey Card Data Report**

The Visitor Survey Card Data Report summarizes the results of a 1998 visitor survey conducted at SHEN. Within the Report, graphs illustrate survey results for three satisfaction indicator categories – park facilities, visitor services, and recreational opportunities.

### **Shenandoah National Park Visitor Study, Summer 2001**

The report describes the results of a visitor study at SHEN during July 15-21, 2001. A total of 900 questionnaires were distributed to visitors, and 691 were returned.

### **Shenandoah National Park Headquarters 2003 Daily Log**

The Daily Log is a log that counts daily requests for information that SHEN Headquarters receives. Methods of contact include telephone, mail, e-mail, and physical visits. The Daily Log also notes weather conditions.

### **Front Royal Visitors Center Year-End Report, 2002**

The Year-End Report describes Front Royal Visitors Center activity for 2002. The Report lists demographics for the information requests and tallies responses to the following question in the Guest Register: “What prompted your trip to Front Royal?” The Report also provides counts of visitors to the Front Royal Visitors’ Center for every month of the years 1998 through 2002.

### **Aramark Statistics**

A report outlining the personnel and facilities managed by SHEN’s concessionaire.

### **Virginia Tourism Corporation 2002 UK Conversion Study Results**

This report summarizes the important findings of visitors from the UK to the Capital Region USA. The sample provides a snapshot of respondents to a questionnaire, representing inquirers of travel-planning information for the Capital Region USA.

### **Rockingham County/City of Harrisonburg Facts and Figures 2004**

This report, compiled and published by the Central Shenandoah Planning District Commission, describes various characteristics of the community, including population, housing, employment, and transportation.

| REPORT DOCUMENTATION PAGE   |                     |                                |                                     | Form Approved<br>OMB No. 0704-0188                                   |   |
|---|---------------------|--------------------------------|-------------------------------------|--|---|
| <p>The public reporting burden for this collection of information is estimated to average 1 hour per response, including the time for reviewing instructions, searching existing data sources, gathering and maintaining the data needed, and completing and reviewing the collection of information. Send comments regarding this burden estimate or any other aspect of this collection of information, including suggestions for reducing the burden, to Department of Defense, Washington Headquarters Services, Directorate for Information Operations and Reports (0704-0188), 1215 Jefferson Davis Highway, Suite 1204, Arlington, VA 22202-4302. Respondents should be aware that notwithstanding any other provision of law, no person shall be subject to any penalty for failing to comply with a collection of information if it does not display a currently valid OMB control number.</p> <p><b>PLEASE DO NOT RETURN YOUR FORM TO THE ABOVE ADDRESS.</b></p>  |                     |                                |                                     |  |   |
| 1. REPORT DATE (DD-MM-YYYY)<br>May 2005   |                     | 2. REPORT TYPE<br>Final Report |                                     | 3. DATES COVERED (From - To)<br>NA                                   |   |
| 4. TITLE AND SUBTITLE<br>Shenandoah Alternative Transportation Planning Study   |                     |                                |                                     | 5a. CONTRACT NUMBER<br>NA  |   |
|   |                     |                                |                                     | 5b. GRANT NUMBER<br>NA   |   |
|   |                     |                                |                                     | 5c. PROGRAM ELEMENT NUMBER<br>NA                                     |   |
| 6. AUTHOR(S)<br>Armstrong, Robert<br>Plosky, Eric<br>Spiller, David<br>Switkes, Frances<br>Poe, Carson<br>Brazelton, Garth  |                     |                                |                                     | 5d. PROJECT NUMBER<br>PMIS 56093                                     |   |
|   |                     |                                |                                     | 5e. TASK NUMBER<br>NPS TIC No. D-287                                 |   |
|   |                     |                                |                                     | 5f. WORK UNIT NUMBER<br>NA   |   |
| 7. PERFORMING ORGANIZATION NAME(S) AND ADDRESS(ES)<br>US DOT Research and Innovative Technology Administration<br>John A. Volpe National Transportation Systems Center<br>55 Broadway<br>Cambridge, MA 02142-1093   |                     |                                |                                     | 8. PERFORMING ORGANIZATION<br>REPORT NUMBER<br>VNTSC-NPS-05-07       |   |
| 9. SPONSORING/MONITORING AGENCY NAME(S) AND ADDRESS(ES)<br>National Park Service<br>Alternative Transportation Program<br>1201 Eye St. NW<br>Washington, DC 20005   |                     |                                |                                     | 10. SPONSOR/MONITOR'S ACRONYM(S)<br>WASO/ATP                         |   |
|   |                     |                                |                                     | 11. SPONSOR/MONITOR'S REPORT<br>NUMBER(S)<br>(see 5d. and 5e. above) |   |
| 12. DISTRIBUTION/AVAILABILITY STATEMENT<br>Public distribution/availability.  |                     |                                |                                     |  |   |
| 13. SUPPLEMENTARY NOTES<br>This report addresses alternative transportation decision factors as indicated below (Y/N/NA):<br>(Y) Non-construction options; (NA) park carrying capacity; (Y) life-cycle/ops. & maintenance costs; (Y) cost-effectiveness.  |                     |                                |                                     |  |   |
| 14. ABSTRACT<br>This project addresses various transportation issues related to Shenandoah National Park, helps to facilitate the participation of Shenandoah National Park in regional traveler-information systems, and helps to provide a better understanding of the socioeconomic conditions and trends in the Shenandoah Valley region that may potentially influence current and future visitation. Specific goals of this project included: (1) reviewing existing visitor-survey data and other relevant information to determine what specific traveler-information services are desired by visitors; (2) facilitating partnerships with Travel Shenandoah, the Virginia Department of Transportation, and other interested stakeholders; (3) determining the characteristics of an appropriate replacement vehicle to serve Rapidan Camp; (4) assessing Skyline Drive scenic overlooks and recommending ATS-related design, safety, and visitor-information improvements; (5) conducting a socioeconomic study of the Shenandoah visitor region to identify trends that will affect visitation to the park; and (6) identifying transportation data for possible future GMP updates. |                     |                                |                                     |  |   |
| 15. SUBJECT TERMS<br>Shenandoah National Park, Rapidan Camp, Skyline Drive, Alternative Transportation Systems, Intelligent Transportation Systems  |                     |                                |                                     |  |   |
| 16. SECURITY CLASSIFICATION OF:   |                     |                                | 17. LIMITATION OF<br>ABSTRACT<br>NA | 18. NUMBER<br>OF<br>PAGES<br>127                                     | 19a. NAME OF RESPONSIBLE PERSON<br>Bob Holzheimer           |
| a. REPORT<br>None   | b. ABSTRACT<br>None | c. THIS PAGE<br>None           |                                     |  | 19b. TELEPHONE NUMBER (Include area code)<br>(617) 223-5137 |



As the nation's principal conservation agency, the Department of the Interior has the responsibility for most of our nationally owned public lands and natural resources. This includes fostering sound use of our land and water resources; protecting our fish, wildlife, and biological diversity; preserving the environmental and cultural values of our parks and historic places; and providing for the enjoyment of life through outdoor recreation. The department assesses our energy and mineral resources and works to ensure that their development is in the best interests of all our people by encouraging stewardship and citizen participation in their care. The department also has a major responsibility for American Indian reservation communities and for people who live in island territories under U.S. administration.